MARCH, 1948

Railway Engineering and Maintenance

No matter where the IMPROVED FAIR RAIL ANCHOR is in use—whether on railways down where the cotton blossoms grow, or up in frigid climes—its dependability and effectiveness is always assured.

Courtesy Illinois Central R.R.

THE P. & M. CO.

CHICAGO • NEW YORK • DENVER • WASHINGTON • ST. LOUIS • CLEVELAND • ST. PAUL • BOSTON • SAN FRANCISCO
MEXICO D. F.

Main Line TO MAINTENANCE ECONOMY

A beautiful stretch of track—a big investment in time and money—well maintained to accommodate heavy, high speed traffic which must continually travel over it in order to pay dividends. The accumulation of small troubles can break down this efficiency and create higher maintenance cost for such track. Some such maintenance troubles can be avoided by using Reliance Hy-Pressure, Hy-Crome Spring Washers for track joint bolts. Their reactive pressure keeps bolts TIGHTER LONGER.

We would appreciate a call from you at booths 75-76 at the National Railway Appliance Association Exhibit during the A.R.E.A. convention in Chicago, March 15th to 18th. See the new Xtra-hy Hy-Crome Spring Washer. It will meet the proposed new A.R.E.A. specifications.

Edgemark of Quality

EATON
EATON MANUFACTURING COMPANY

Reliance HY-PRESSURE HY-CROME *spring washers*

RELIANCE DIVISION
Offices and plant: MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

2 Simple Steps—

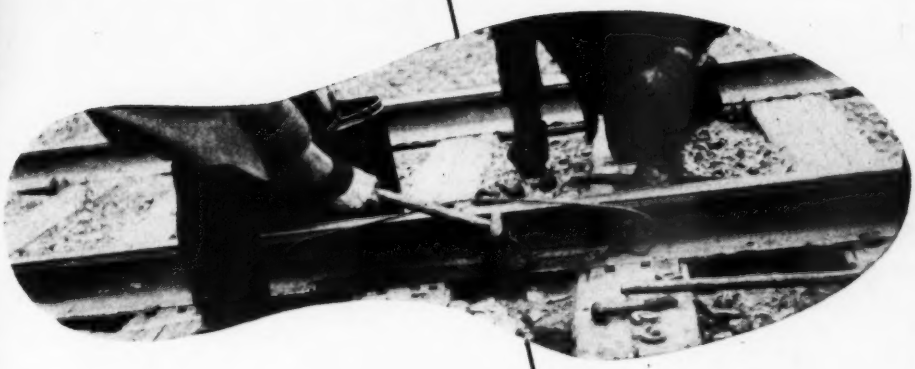
completely protect Joint Bars AGAINST CORROSION

NO-OX-ID "A SPECIAL"

For protection of rail joints against corrosion and to provide lubrication at the fishing area.

NO-OX-ID JOINT BAR FILLER

A new mastic formulation of No-Ox-Id used as a stopper or plug to close the ends of joint bars.



STEP #1

No-Ox-Id "A Special" for protection against corrosion and lubrication of rail joints. This well-known and established product fulfills the double duty of the job condition. Tables are available, on request, showing amounts of material required for a mile of track with various rail weights.

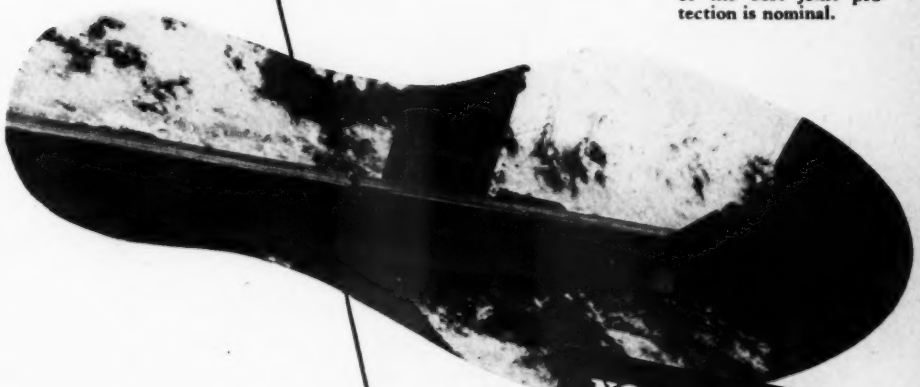
The cost of No-Ox-Id for this use, compared to your present material, may be a relatively minor added cost. By comparison with the outlay for a mile of track, the cost of the best joint protection is nominal.

STEP #2

No-Ox-Id Joint Bar Filler completes the protection by sealing out rushing air laden with brine, grit, and dirt.

Joint Bar Filler is a No-Ox-Id formulation to serve as a plug or stopper at the ends of the joint bars, and prolong the service life of the lubricating qualities of No-Ox-Id over the fishing area.

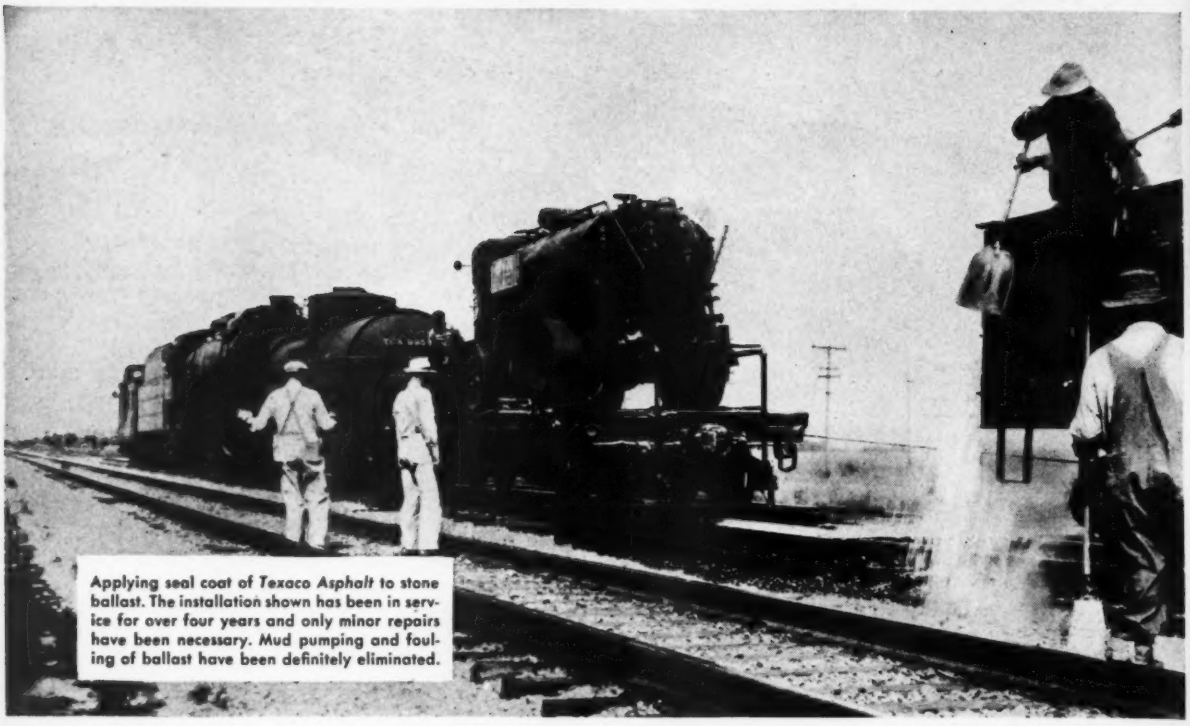
While it has been in use on test sections of main line track for over a year, it is being announced now for the first time. It is easy to apply with paddle or putty knife after the joint is permanently assembled.



THE *Original* RUST PREVENTIVE

Dearborn Chemical Company
Dept. U, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $3.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.



Applying seal coat of *Texaco Asphalt* to stone ballast. The installation shown has been in service for over four years and only minor repairs have been necessary. Mud pumping and fouling of ballast have been definitely eliminated.

SET-UP FOR SAVINGS

Stone ballast treated with Texaco Asphalt greatly reduces maintenance costs

Ballast coated and sealed with *Texaco Asphalt* sheds water like a duck's back . . . prevents fouling from dirt and cinders . . . holds track in line and on grade for years with a minimum of attention. It's the ideal ballast for station and other hard-to-drain track.

Ballast treated with *Texaco Asphalt* stays flexible. It does not crack under traffic and can be tamped even after long service. No wonder maintenance costs drop sharply! And there's added economy in the low first cost of *Texaco Asphalt*, and its easy application.

Only quality asphalt will bring you these benefits. Be sure you use *Texaco Asphalt* — proved through forty years of service on America's streets, highways and railroads.

Find out how *you* can save with *Texaco Asphalt*. Call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, N. Y.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

TEXACO

TEXACO Asphalt for Coating Ballast

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW featuring Alan Young every Wednesday night. See newspapers for time and station.

Pushing the Missouri Pacific

through Tip Top Mountain

Two million cubic yards of material were involved in the Missouri Pacific cut through Tip Top Mountain. The job went to Clarkson Construction Company of Kansas City, Mo., a Northwest user. The cut will reduce grades that formerly ran up to 2½ per cent and called for two locomotives and will eliminate numerous curves resulting in greatly reduced costs in pulling freight from St. Louis to Little Rock.

Northwest Shovels, Cranes and Draglines bring the railroad and the railway contractor features found in no other crawler equipment. Northwest Shovels are real Rock Shovels. The Northwest Dual Independent Crowd utilizes force other shovels waste. The "Feather-Touch" Clutch Control brings ease of operation without fear of shutdown because of control failure possible with more complicated devices. The Cushion Clutch reduces the effect of shock overloads to all parts under power. Simplicity of design assures ease of maintenance and rugged construction stands up in railway service. Your Northwest goes anywhere, loads and unloads on a standard flatcar under its own power and handles off-the-line work or works from the car. It is a real railway man's machine

NORTHWEST ENGINEERING COMPANY
1513 Field Building • 135 South LaSalle Street • Chicago 3, Illinois

Annual Convention and Road Show
SOLDIER FIELD
CHICAGO
JULY 16-24, 1948

NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

ANNOUNCING A
CAPACITY RATINGS

**Makes possible the use of smaller bearings—
with savings in bearing cost, material cost and weight
—and more compact product design**

IN the ten years since the present load capacity ratings of Timken tapered roller bearings were established, Timken bearings have been steadily improved. Improved so much that today the load carrying capacity of Timken bearings is a good *25% greater* than it was 10 years ago!

As a result, The Timken Roller Bearing Company is now able to announce a 25% increase in the load capacity ratings of all Timken bearings —following a careful review of laboratory studies on fatigue life machines over the past ten years, together with close observation of bearing performance in the field.

Permits Use of Smaller Bearings

Now you can safely carry your present bearing loads on smaller size Timken bearings. Reductions in size of shafts and housings are possible. Products can be made more compact—lighter in weight. You have an opportunity to save both on bearing costs and material costs. And this increase in ratings should enable engineers to utilize the advantages of Timken bearings in an even broader variety of applications than has been practicable in the past.

Result of Constant Quality Improvement

This 25% increase in Timken bearing capacity ratings is based on continued improvement in the quality of Timken tapered roller bearings over the past 10 years. It is due to a number of factors, including improved alloy steels made in our own Timken steel mill specifically for anti-friction bearings, better metallurgical control in the processing of this steel, more accurate manufacturing equipment, greatly improved surface finishes, and more accurate inspection methods. That these improvements in Timken bearing quality have resulted in 25% greater load capacity has been conclusively demonstrated by years of exhaustive laboratory and field studies!

New Engineering Journal to Give Facts

A new Timken Engineering Journal is now in

25% INCREASE IN OF TIMKEN® BEARINGS

The result of years of constant improvement in Timken bearing quality—supported by exhaustive laboratory studies and extensive field experience

preparation which will give complete capacity rating tabulations and will also include new bearings introduced since the last publication. Pending publication of the new Journal you may take full advantage of the 25% capacity increase by multiplying the existing ratings by 1.25.

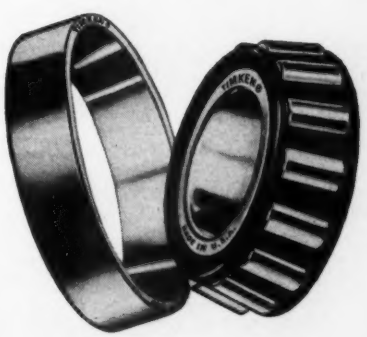
For further assistance in the application of Timken bearings, call upon our field engineers or our Engineering Department.

Timken tapered roller bearings take any combination of radial and thrust loads, hold shafts in rigid alignment, assure precision and minimize friction. The 25% increase in load capacity ratings is the *latest* example of Timken leadership in serving the bearing needs of all industry . . . one more reason why it pays to look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

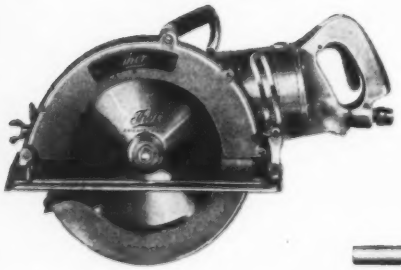


NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ⊣◫⊢ LOADS OR ANY COMBINATION ✳

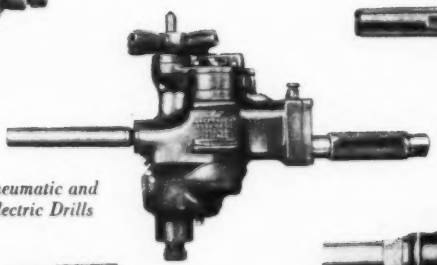
PUT *Thor* IN THE GANG..

Thor Breakers are available in a full range of sizes and styles for digging, tamping, spike driving, concrete breaking, driving sheeting and many other operations.

Thor Pneumatic Breakers are ideal for driving grouting points. Mud points are accurately driven with minimum effort mile after mile.



Pneumatic and Electric Saws



Pneumatic and Electric Drills

Pneumatic and Electric Grinders

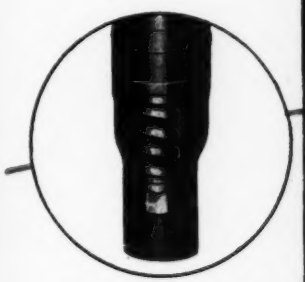
Riveting Hammers

Chipping Hammers

Sinker Rock Drills

.....to speed track and building jobs

ALL ALONG THE LINE



Regular head is quickly replaced by special head for driving spikes.

Progressive track-laying is accelerated with the aid of Thor Pneumatic Breakers equipped with spike-driving heads.

Sump Pumps

This spring and summer, more than ever before, Thor Tools will figure vitally in the tremendous track and building program facing all railroads. More and bigger gangs will travel the sections, and with many will go the Thor Tools long established as time, cost and labor savers on all section jobs . . . grouting, spike driving, digging, tamping, rock breaking, chipping, sawing, drilling and riveting. Put Thor *power . . . speed . . . performance* in YOUR gang—call your nearby Thor branch today for demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY

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Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Denver, Detroit, Houston, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Salt Lake City, Seattle, San Francisco, Toronto, Canada, Sao Paulo, Brazil, London, England

Thor PORTABLE POWER TOOLS

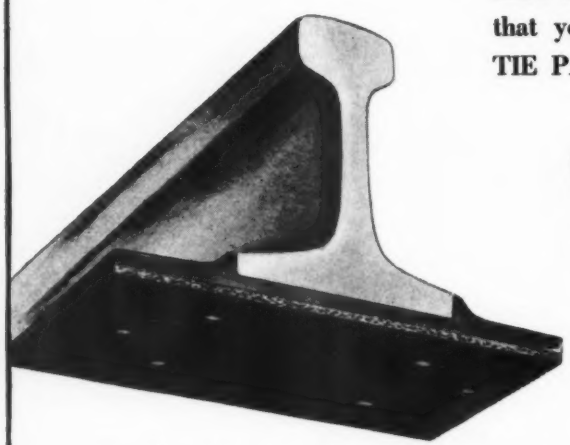
PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

FABCO TIE PADS

For Open Track

After seven years of intensive development we offer FABCO Tie Pads to reduce the mechanical wear of ties *on Open Track . . . and* at prices which make the first cost, as well as the last cost, a real economy to the railroads.

FABCO Tie Pads for Open Track are stocked for delivery in ¼" thickness in standard tie plate sizes 7¾" x 12"; 7¾" x 13"; 7¾" x 14"; with other sizes available on special order ... they withstand extremes of temperature, moisture, brine, mildew, and sand ... *and* their limited resiliency, without permanent set, means that spikes do not have to be driven down a second and third time. Many other advantages make it important that you GET ALL THE FACTS ABOUT FABCO TIE PADS — Today!



"Fabco Tie Pads" Made By The Makers of Fabreeka

Drop In
at Our Booth 178
FABCO TIE PADS
will be on display at the
NATIONAL RAILWAY APPLIANCES ASSOCIATION CONVENTION
International Amphitheatre, Chicago, Ill.
March 15 thru 18

FABREEKA PRODUCTS COMPANY

Incorporated

222M Summer Street • Boston 10, Massachusetts

TEAMWORK THAT CUTS MAINTENANCE COSTS

One of the Blue Brute Track Teams at work in the Boston & Albany Railroad yards at Springfield, Mass.

Count on this perfectly matched Blue Brute Track Team to do a lot of fast, efficient tamping, on very little air! The Hand-i-Air Compressor is as tough as they make 'em yet easily handled by two men. Through its easy-breathing Feather* Valves, this tireless, two-wheeled tornado delivers a steady supply of 60 cu. ft. per min. — ample for its four Blue Brute teammates.

They're the WTT-7 Tie Tampers. Men do *more* work with these light, precision-balanced 42-pounders — and do it ***easier*** and ***faster*** — while advantages like the leak-proof throttle and anti-freeze design mean tops in efficiency and economy under all conditions.

Adding up, here's teamwork that will surface more lineal feet of roadbed per day — every day. Such performance, remember, is typical of all Blue Brutes — the grouters, contractors' pumps, portable concrete mixers, air tools, etc. — that are cutting maintenance and construction costs all along the line. Checking on them — thoroughly — will be a smart move towards saving money in your own operations.

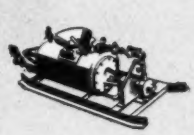
*Reg. U. S. Pat. Off.

HB-4

WORTHINGTON

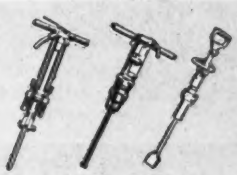
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts
Distributors in All Principal Cities

BUY BLUE BRUTES


Pneumatic Grouter

Portable Concrete Mixer

Self Priming Centrifugal Pump

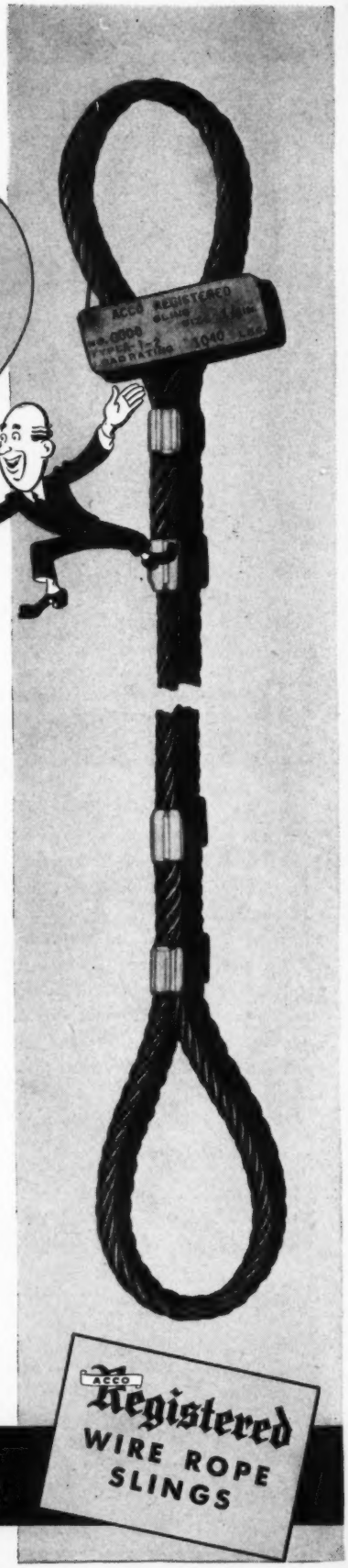

Hand Held Air Tools

Railcar Compressor

FOR EVERY CONSTRUCTION AND MAINTENANCE JOB

FROM A FEW STANDARD UNITS LIKE THIS...YOU CAN

"Make-Your-Own" ACCO Registered 1, 2, 3 or 4-LEG WIRE ROPE SLINGS



You can assemble an Unlimited Variety of Basket, Bridle or Choker Slings

Carry them in Your Tool Room—Acco Registered Wire Rope Slings are universal units made with standard safety loops and in standard lengths. When used with Acco "*Make-Your-Own*" Sling Fittings, you can make a wide variety of combinations.

It is not necessary to carry separate parts for 2, 3, or 4-leg slings. Just stock as many interchangeable parts as needed for the multiple-leg sling you need for your lifting jobs.

Fittings Never Leave Your Plant—Acco Sling fittings are specially designed. They can be used over and over again, and in various combinations. If a sling leg gets damaged, you replace only that leg. The fittings never leave your plant.

Factory Proof-Tested—Acco Registered Wire Rope Slings are proof-tested at the factory, then registered in your name, and identified with a metal tag giving serial number and rated capacity. Acco Registered Sling Fittings are also proof-tested. You buy a certain capacity—and know that you get it in full.

Call your jobber today or write the nearest Acco office listed below for a copy of the S-2 Acco Registered WIRE ROPE SLING folder. See how simple it is to "*Make-Your Own*" Slings.

MEMBER THE NATIONAL SAFETY COUNCIL

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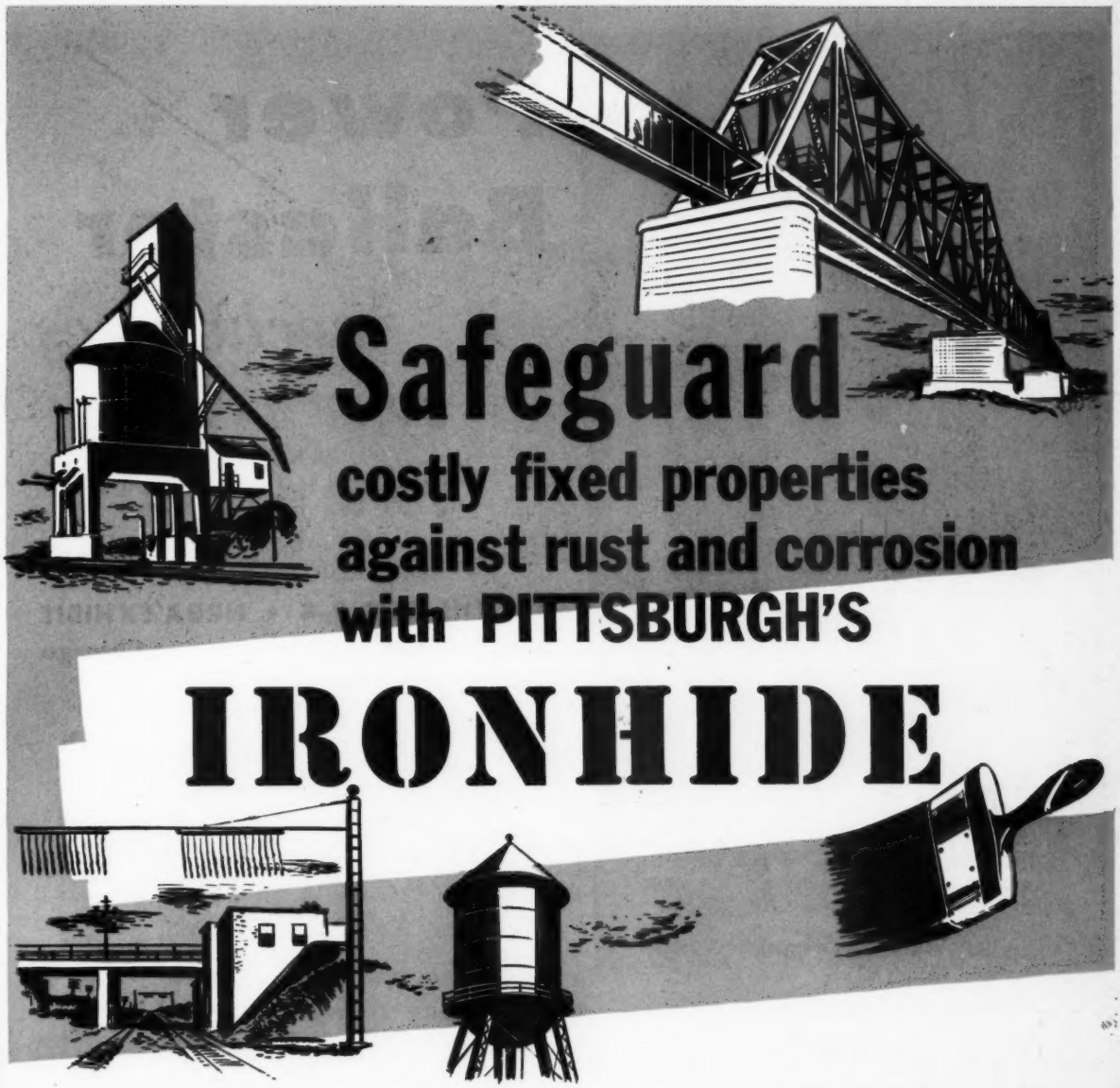
ACCO

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

ACCO Registered WIRE ROPE SLINGS



Safeguard

costly fixed properties against rust and corrosion with PITTSBURGH'S

IRONHIDE

PITTSBURGH'S IRONHIDE is a tough, elastic, long-lasting finish specially formulated for the decoration and preservation of iron and steel structures.

It resists rust and corrosion . . . withstands industrial gases, oil, soot and other destructive agents . . . adheres firmly to metal surfaces during extremes of heat and cold.

IRONHIDE dries for recoating overnight when brushed or in only six to eight hours when sprayed. It is available in Red, Black, Light Gray and Aluminum for use on all metal surfaces.

Other Pittsburgh Industrial Finishes available for maintenance of fixed properties include: STATIONHIDE for interiors and exteriors of buildings; CEMENTHIDE for cement surfaces; SNOLITE for signs, fences, cattle guards and crossing gates; traffic and zone marking paints; and a series of Color Dynamics finishes for use in shops and on machinery.

Write today for Pittsburgh's new booklet which lists its complete line of Railway Structural Maintenance Finishes, contains a helpful array of color chips and offers many practical suggestions for the most efficient and economical use of these fine coatings.

PITTSBURGH PLATE GLASS COMPANY, Industrial Paint Division, Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, California; Portland, Oregon. Ditzler Color Division, Detroit, Michigan. The Thresher Paint and Varnish Company, Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio.

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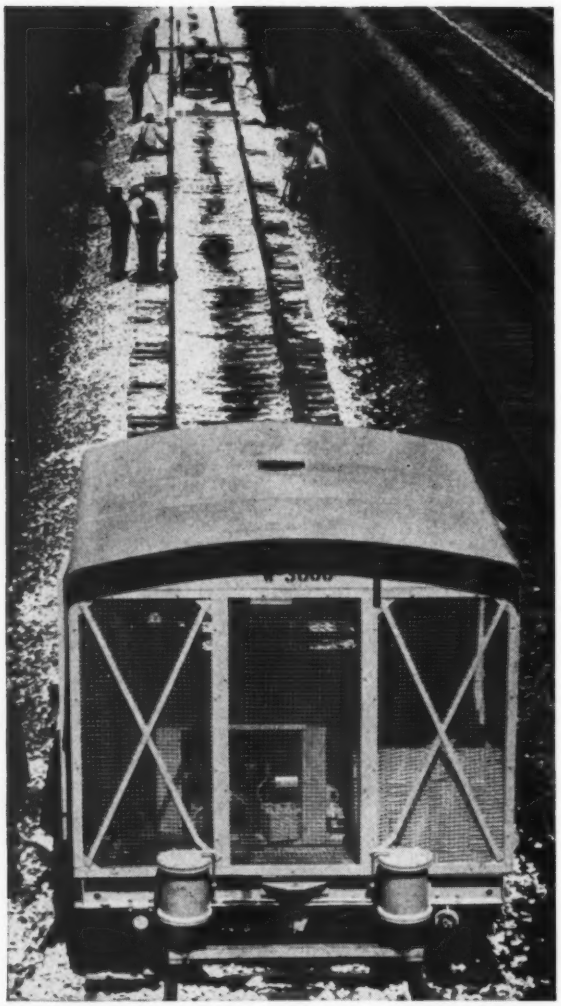
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY



Power Track Ballaster

Power Track Cribbing Machine

Power Ballaster *mechanizes*

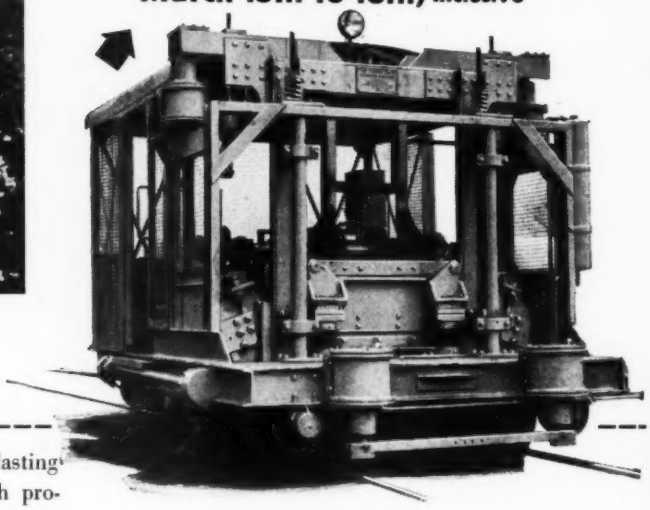
CRIBBING AND TAMPING

SEE DEMONSTRATION

BOOTHS 202-3-4 • NRRA EXHIBIT

International Amphitheatre • Chicago

March 15th to 18th, *Inclusive*



THESE revolutionary machines now speed ballasting and drainage correction operations on such progressive railroads as New York Central, Pennsylvania, Erie, Northern Pacific, and Great Northern. They not only save up to 50% in cost per mile of track but turn out a more uniform job faster . . . getting the work done under the present manpower conditions.

The Power Track Cribbing Machine does the work of a large cribbing gang with an efficiency impossible with hand tools. The Power Track Ballaster forces ballast uniformly under each tie and tamps it with uniform firmness. Each can be set off track by its own power in less than 5 minutes.

Exhibit includes full-size Power Ballaster; quarter-scale models of Ballaster, Cribbing Machine in operation; and motion pictures of these machines in action. Also quarter-size model of the new Ballast Cleaner to be added to the complete line of trade equipment developed by the Power Ballaster Division of Pullman-Standard.

POWER BALLASTER DIVISION

Pullman-Standard CAR MANUFACTURING CO.

© 1948, P.S.C.M.CO.

79 East Adams Street, Chicago, Illinois

RIC-WIL *Foilclad* PIPE UNITS

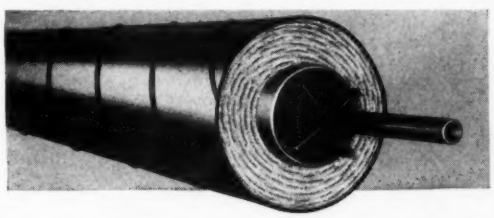
Combine Efficiency and Durability with Low Cost Installation and Maintenance

Factory prefabricated, insulated and weatherproofed, Ric-wiL Foilclad Pipe Units are especially designed for pipe distribution systems carrying oil and other viscous fluids, process liquids, refrigerants, steam or water.

Custom built to project specifications, Foilclad Units, in 21 ft, lengths, complete with odd lengths, couplings, and accessories as required, are delivered ready for immediate *single-handling* installation on arrival. The Ric-wiL Unit system reduces to a minimum the costly, tedious and frequently dangerous field work often involved in other types of piping installations.

Foilclad Units are designed so that field welding of pipe is a quick and easy operation. Several units at a time may be coupled on the ground before hoisting into position, eliminating a considerable amount of scaffolding.

More important, the Ric-wiL method of factory prefabrication and insulation—*exclusive with Ric-wiL*—assures a pre-tested, dependable, permanent system that eliminates ordinary maintenance and repair expense otherwise frequently required.



The insulated, jacketed pipe unit, above, is designed so that any required temperature can be maintained in transmitting fluids. Either pipe can be used to carry the process liquid while the other carries the heating or cooling medium, gas or liquid.

The outer pipe is covered with laminated asbestos insulation—or other type insulation as required—in any thickness desired. Insulation is machine coated with high temperature asphalt and tension-wrapped with asbestos felt, followed by second coating of asphalt. The final covering is a spiral tension wrapping of aluminum or copper foil bonded with the asphalt coating. The result is a rugged and durable unit, corrosion resistant and fully weatherproofed.

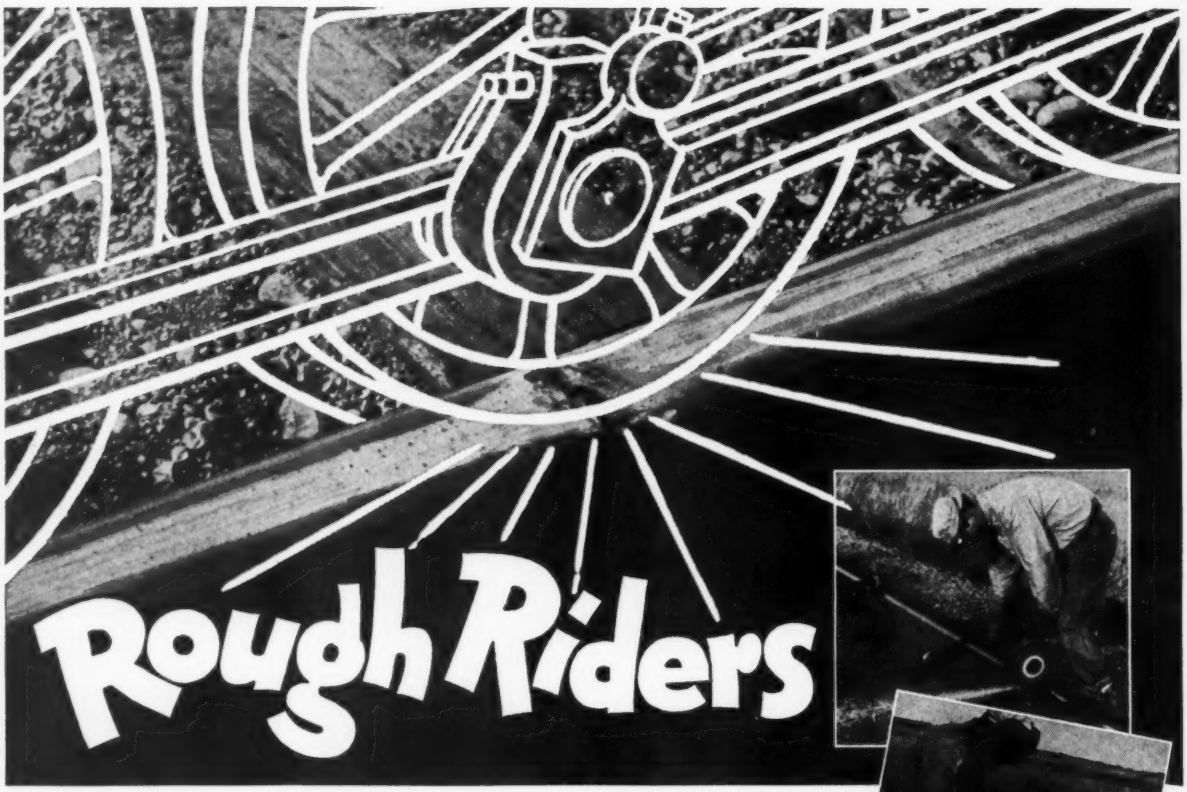
Write for Form 4708, for additional information on Foilclad and other Ric-wiL Units. Address The Ric-wiL Company, Cleveland, Ohio, Dept. 1383

RIC-WIL

INSULATED PIPE CONDUIT SYSTEMS

THE RIC-WIL COMPANY • CLEVELAND, OHIO

CABLE ADDRESS: RICWIL, BENTLEY'S CODE



cured with Amsco Railface . . .

"Rough Riders"—that's an heroic term, in history books, but not when it's applied to the rails over which the passenger and freight trains roll across the country. Such worn and battered rail ends as are shown above can only mean passenger discomfort and unnecessary wear and tear on equipment. Amsco Railface electrodes are giving phenomenal results in keeping rail joints smooth for rider satisfaction and reduced equipment maintenance costs.

The small photographs show how the spalled or battered sections are ground, the welding operation, the joint after welding, and the completed weld after grinding ends to conform to balance of rail section. With an as-deposited Brinell of 325 to 350, work-hardening to 380 Brinell, this specialized electrode for high carbon content rail assures smooth joints that STAY SMOOTH.

This is another in the long line of Amsco Conservation Welding products that effect savings daily by reclaiming rebuilding, repairing, or hard-facing of parts subject to wear and service abuse. Complete details of all products are available in Bulletin 1047-W.

AMERICAN **Brake Shoe** COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. Made and sold in Canada by Canadian Ramapo Iron Works, Inc., Niagara Falls, Ont.

MANGANESE STEEL CASTINGS
"CHROME-MOLY" STEEL CASTINGS
HARDFACING ELECTRODES
GRINDING MILL PARTS

DIPPERS DREDGE PUMPS CRUSHER PARTS CHAINS SOLIDS PUMPS BUCKETS WHEELS

For additional information, use postcard, pages 231-232

A New Diesel

for Railroad Construction . . .

The INTERNATIONAL TD-24

Here is the new, versatile giant of power and pull with which you can speed up earthmoving operations in building your new road beds. New routes, spurs, sidings, extensions, grade separations and the like, get done faster as your earthmoving power increases.

The TD-24 is *America's most powerful crawler.* Its Diesel engine develops 180 horsepower at the flywheel and puts 140 working horsepower at the drawbar for operating giant earthmoving machines.

And it is *fast* . . . built for high-speed operation as well as tremendous pull. Yet, *finger-tip control, planet-power steering, 8 speeds forward and 8 reverse* and many other features make it easy to handle.

Get all the facts about this new tractor from your International Industrial Power Distributor.

INTERNATIONAL HARVESTER

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This light-stepping Fairbanks-Morse 57D is the ideal one-man motor car for everyone from track supervisor to signalman. Light, compact . . . room for two men and equipment . . . familiar, trusted transportation on rails the world over.
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. . . WILL SERVE YOU WELL

RAILROADS prefer Moss crossings because they're securely anchored to the cross ties in track and aren't subject to heaving, when the winter freezes and thaws occur.

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RAILROADS will "write in" our sectional crossings for their inherent economy. Made of pre-framed, creosoted black gum, they can expect many years of trouble-free service.

RAILROADS specify Moss crossings simply because they're the best crossings to be had in any shape, form or fashion.

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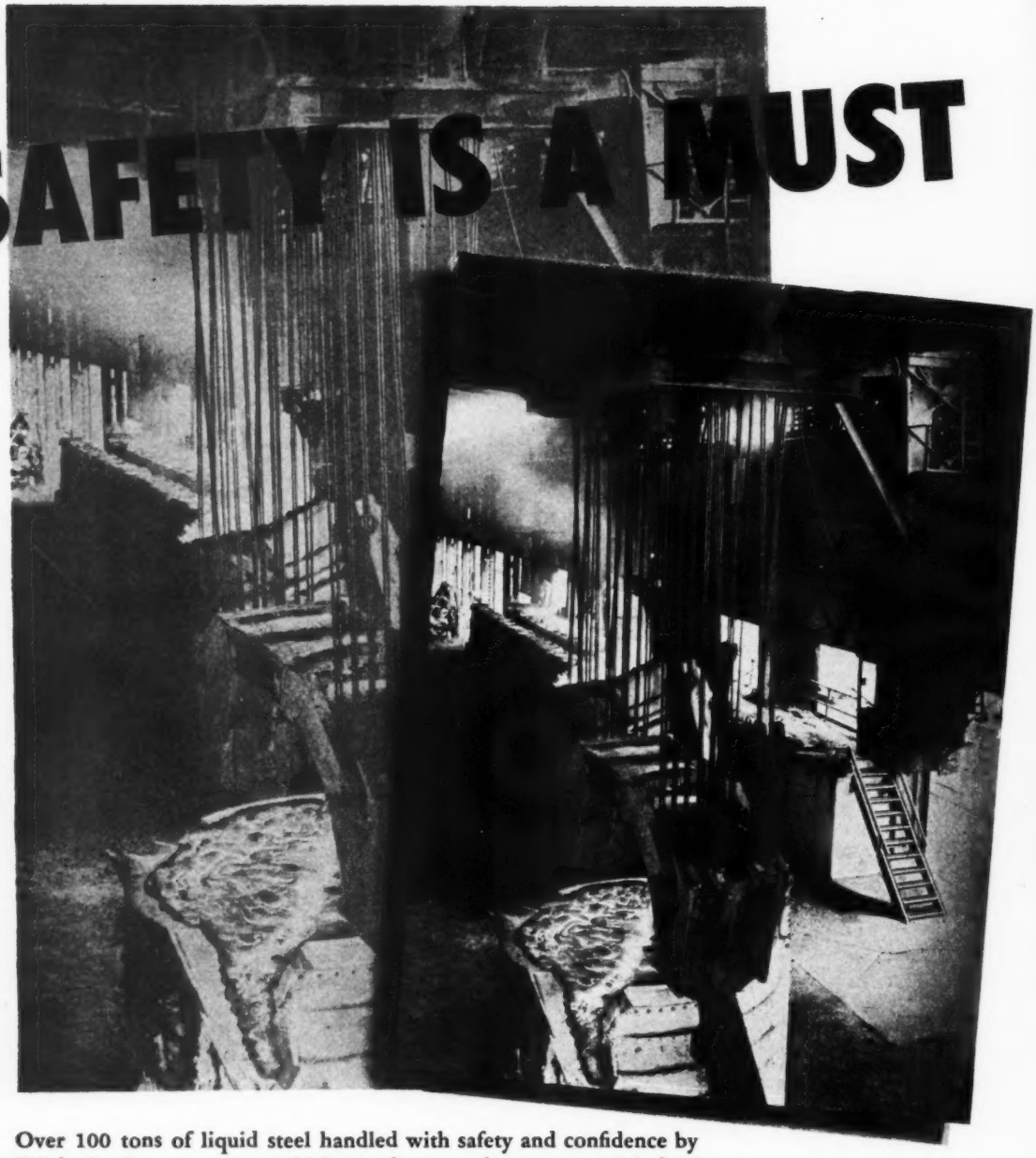

Over 100 tons of liquid steel handled with safety and confidence by Wickwire Rope . . . rope which stands up under constant grind 24 hours per day. Select the Wickwire Rope to best meet your particular needs... rope which will give dependable performance under constant, heavy duty service. Wickwire Rope engineers are ready to serve you.

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The New Ingersoll-Rand SPOT-AIR Compressor

THE new Ingersoll-Rand SPOT-AIR is the compressor railroad men have needed for years. Light enough to carry, yet big enough to run two tie-tampers, this gasoline powered unit is adaptable to every phase of railroad maintenance work.

The SPOT-AIR requires very little room in the section storehouse or on a section car... and there's ample room in any center ditch for the SPOT-AIR to operate under traffic. In combination with the new lightweight J-10 Utility Jackhamer and other I-R Air-Tools, you'll find hundreds of uses for the SPOT-AIR in bridge and building, grade-crossing and signal maintenance, and on numerous emergency jobs.

You can get complete details by asking for the SPOT-AIR Bulletin...or better still, see the SPOT-AIR at the National Railway Appliance Association Convention in Chicago, March 15-19. Booths 32, 33, and 34.

220-2

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Right before your eyes

At The March N. R. A. A. Exhibit
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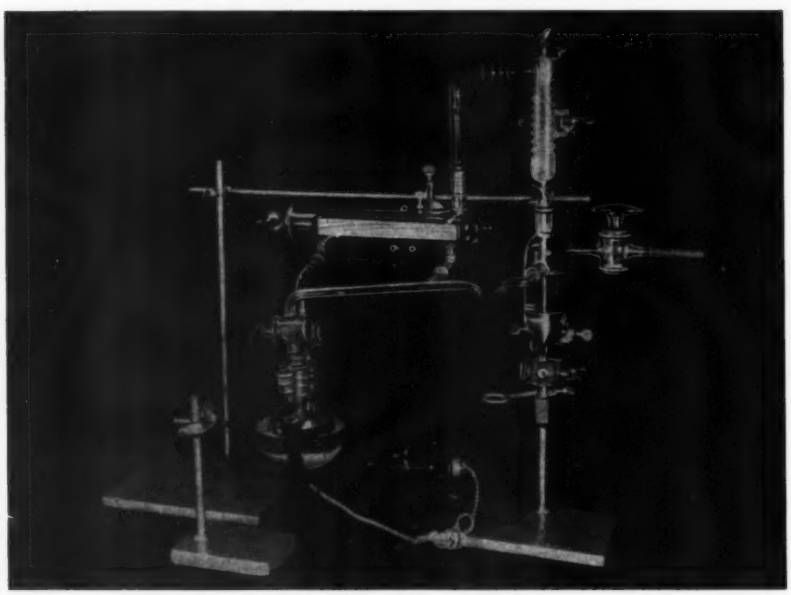

Glass Laboratory Model

You have heard about it . . . read about it. . . . Now you can *see* wood being Vapor-Dried in a working model.

By witnessing the Vapor-Drying Process in operation, you will readily understand how costs may be reduced and better, longer lasting products obtained.

*Process Pat'd.

TAYLOR-COLQUITT CO., SPARTANBURG, S. C.

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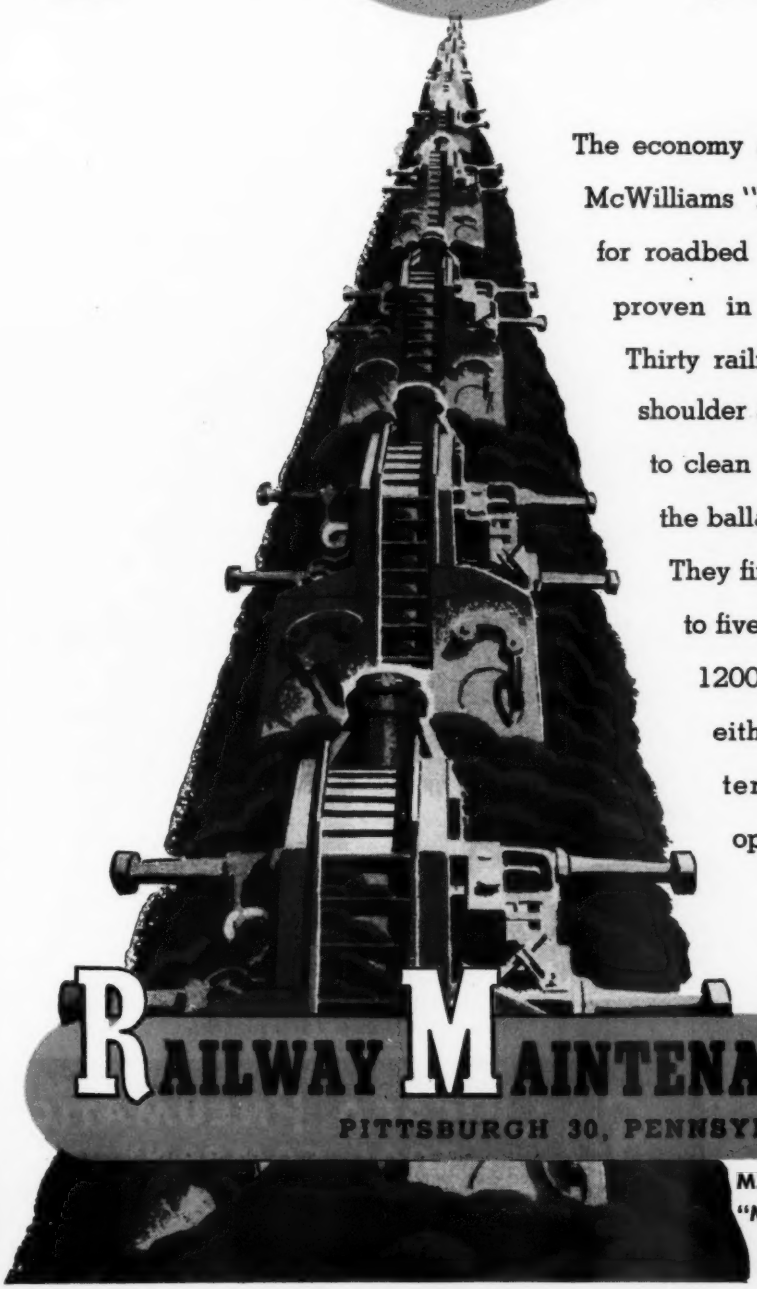
McWILLIAMS MOLES USED BY

30

RAILROADS



The economy and efficiency of the McWilliams "Mole" Ballast Cleaner for roadbed maintenance is being proven in service every day. Thirty railroads use 389 of the shoulder and intertrack models to clean dirt and cinders from the ballast of their roadbeds. They find that a crew of four to five men can clean 850 to 1200 feet in 8 hours with either model without interference with train operations.

RAILWAY MAINTENANCE CORP.

PITTSBURGH 30, PENNSYLVANIA

MANUFACTURERS OF THE McWILLIAMS "MOLE" and RMC RAIL JOINT PACKING

THE TAMPER

...that gets under Frogs and Switches

Even under switches and frogs it's easy to use the CP-5 Gasoline Tie Tamper. Its slender lower end adapts it for use in narrow places, and its compact engine design permits an unobstructed view of the work.

Starting is quick and easy — by pressure on one of the grip handles.

Balance is perfect — weight is centered between grip handles.

Vibration is minimized in grip handles by air-cushioning of return stroke of free-throw striking piston — machine life is prolonged.

Magneto provides efficient ignition system under all conditions — there are no batteries, thus eliminating costly battery replacements.

Standard two-cycle engine operates on gasoline-oil fuel mixture — oil in fuel provides automatic lubrication.

Booths 187 and 188
National Railway Appliances Association
Chicago, March 15th to 18th

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General Offices: 8 East 44th Street, New York 17, N. Y.

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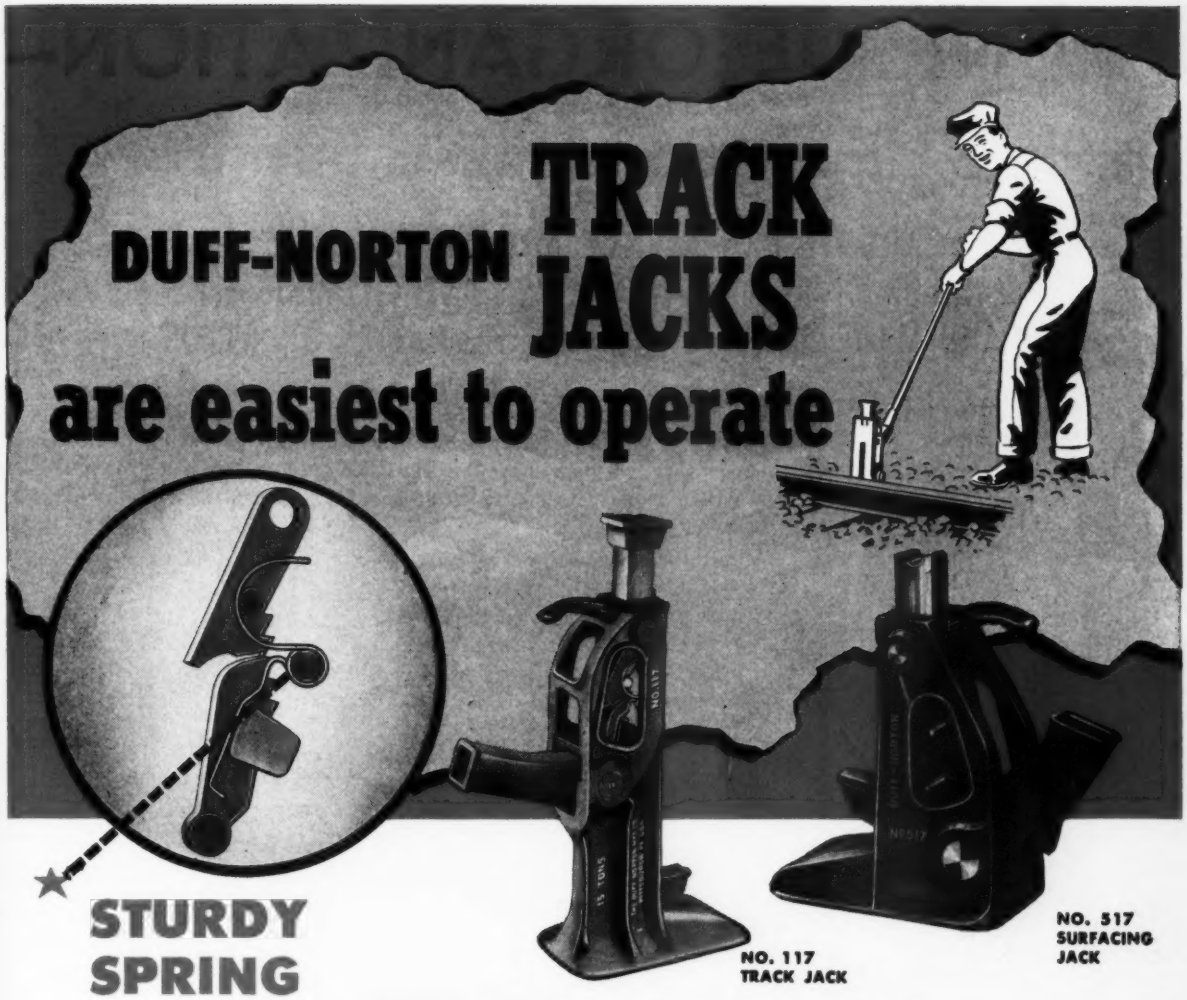
DUFF-NORTON TRACK JACKS are easiest to operate



ASSURES QUICK, POSITIVE, SMOOTH OPERATING ACTION

Duff-Norton Jacks are favorites with section gangs for maintenance, surfacing and lining of heavy track. Less jacking effort is required—tripping is quick and positive with spring actuated pawl—and these jacks are more economical since all parts except housing and lifting racks are interchangeable. Why not give your workmen and your road the benefits of these high quality jacks—always specify Duff-Norton.

Visit Booth 71 at the National Railway Appliances Association Exhibition. See our complete line of railroad jacks—including our new 117-A light weight aluminum track jack.

QUICK REFERENCE DATA ON TRACK JACKS YOU NEED!

Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Head Inches	Foot Lift Ht. Inches	Weight Pounds
117	15	22	13	6½x11	3x3	2	60
117A	15	22	13	6½x11	3x3	2	42
217	15	16½	7½	6½x11	3x3	2	52
617	15	28	18½	7x12	3x3	2	75
517	15	11	5	6½x10¼	3x3	2	40

Write today for complete catalog on Duff-Norton Jacks

65th Anniversary DUFF-NORTON JACKS

THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built" • **PITTSBURGH 30, PA.**

THE WORLD'S LARGEST AND OLDEST MANUFACTURERS OF LIFTING JACKS

A UNIQUE ORGANIZATION—

In a Highly Specialized Business

65 YEARS OF EXPERIENCE AND AN ORGANIZATION MADE UP OF REAL RAILROAD MEN AND CHEMISTS WHO HAVE MADE A LIFE STUDY OF THE HABITS OF WEEDS

You can purchase a book filled with formulae showing that salt and a lot of other raw materials will kill weeds. But you can't purchase the experience and know-how that railroads need to assure a program over a period of years which will show satisfactory results for the investment necessary.

The Chief Engineer of a large system put it this way—

> "If it were possible to lay aside one day each year to kill weeds on our tracks, I would work to that plan. I know it can't be done that way but I consider that the Reade Company comes as close to that accomplishment as it is possible to come."

We bring to your line a complete spray train—our own equipment. All the railroad is asked to provide is work train service.

Why not review with us at this time your weed killing problem for 1948?

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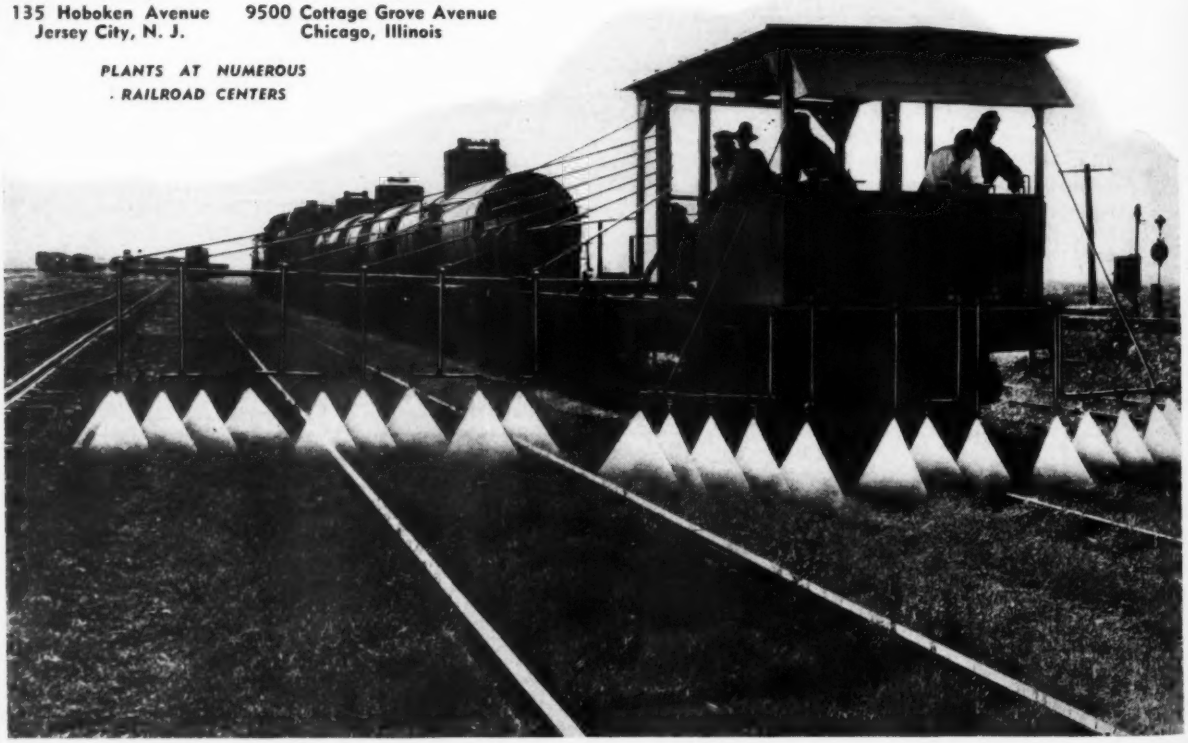

DUCK SOUP FOR THIS 'DOZER

THE "Caterpillar" Diesel Tractor and Bulldozer you see above wades right through the toughest assignments you can find. And there are plenty of rough jobs for them along most rights of way.

The drainage problem being cleared up here is only one of many railway earthmoving projects which "Caterpillar" Diesel Tractors and auxiliary equipment can do quickly and economically. Their versatility and dependable power turn in equally efficient performance when filling low spots, building grades, cleaning stream beds, roughing out ditches and spreading ballast.

"Caterpillar" Diesels are built to give you the best in hard-hitting, balanced units at the lowest operating costs. Add to that a dealer service that is recognized as "the best in the business."

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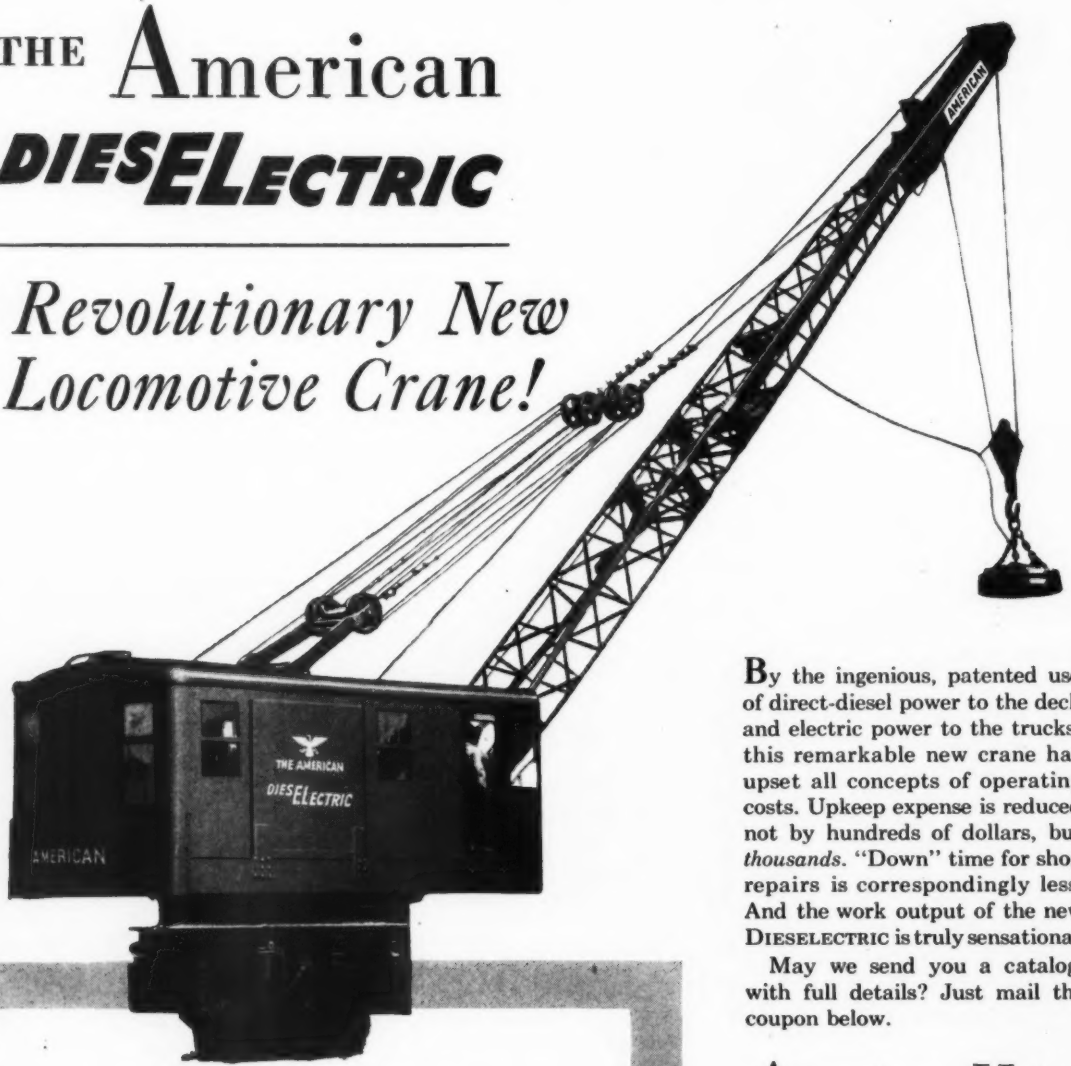
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

THE American DIESELECTRIC

A Revolutionary New Locomotive Crane!



By the ingenious, patented use of direct-diesel power to the deck and electric power to the trucks, this remarkable new crane has upset all concepts of operating costs. Upkeep expense is reduced not by hundreds of dollars, but *thousands*. "Down" time for shop repairs is correspondingly less. And the work output of the new DIESELECTRIC is truly sensational.

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HIGH SPEED *"Live-Boom" Action*

CREATED BY NEW, IMPROVED BOOM HOIST

* * *

● A remarkable new boom hoist mechanism brings *live-boom* action to the DIESELECTRIC. On old style cranes with jaw clutch boom hoists, the boom radius was seldom changed in operation. But here the operator has a smooth, air-controlled *friction* clutch . . . fast spur gear drive, instead of slow, inefficient worm drive . . . and a safe, efficient foot brake *plus controlled lowering speed*. He swings the boom up or down in 45 seconds. This motion is *simultaneous* with hoisting, slewing or traveling. Result: INCREASED WORK OUTPUT!

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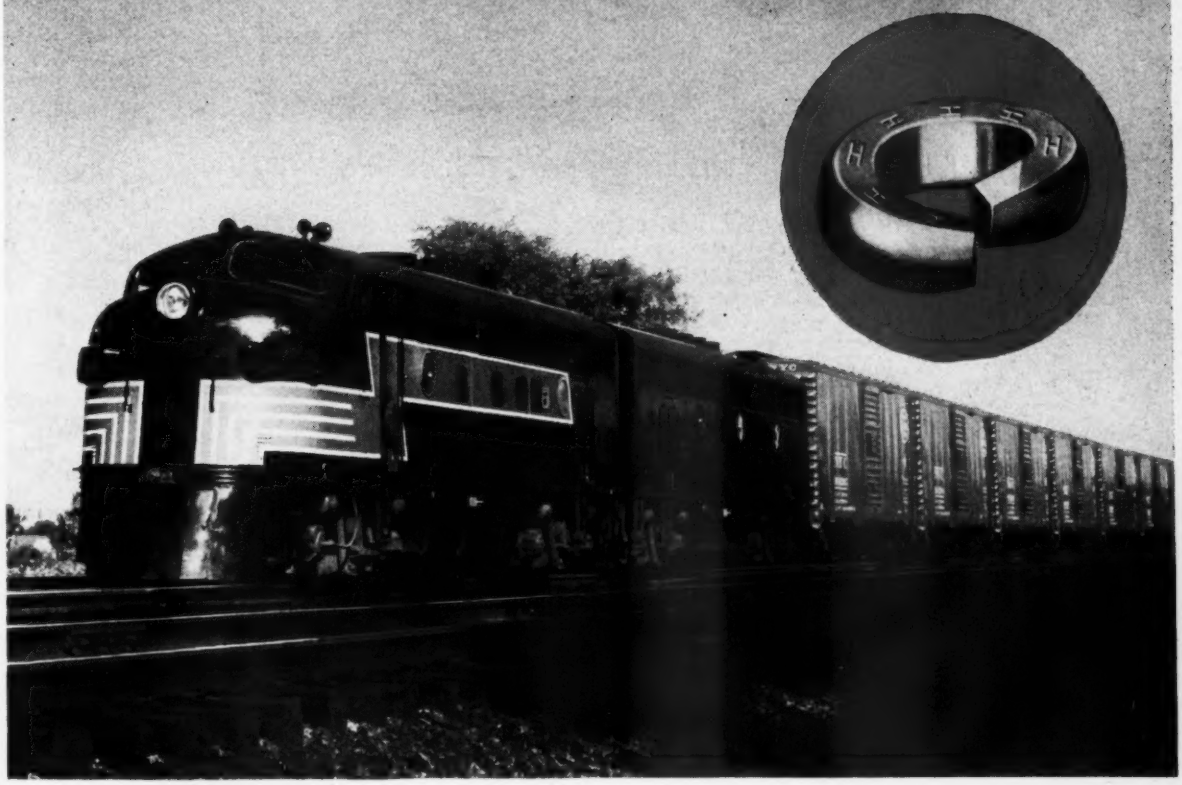
Super Service

ALLOY SPRING WASHERS



Super Steel Type

Surplus Reactive Pressure is the key to the economy of Hubbard SUPER SERVICE Spring Washers. They deliver 130% more reactive pressure than required in A.R.E.A. specifications. Widely used Hubbard SUPER STEEL Spring Washers also exceed A.R.E.A. specifications. Either of these types provides vital, economical protection on main line track, turnouts, frogs and crossings.

HUBBARD and COMPANY

Tool Division

NOW an EVEN BETTER DISSTON CHAIN SAW

with Mercury Gasoline Engine

ESTABLISHED 1840

REG. U.S. PAT. OFF.

TWO NEW FEATURES ADDED

AUTOMATIC CHAIN LUBRICATION

An improved feature that provides many important advantages.

It has been relocated from tail stock to engine, thus adding extra protection to clutch lever and providing other advantages.

Transmission is lubricated independently from the Automatic Chain Lubricator—thus a wider variety of lubricants are suitable for oiling the chain.

The cam-operated pump develops positive pressure with each turn of sprocket . . . and applies it automatically, in any desired volume, all the way to point of outlet. Flow shuts off, the instant clutch is disengaged. Pressure prevents saw dust and other foreign matter from working into oil line and clogging it.

Flow of oil is constant for any position encountered in felling and bucking.

Will stand up better in service because there are no exposed oil lines to break or mash.

Easy to refill, simple to operate and keep in top working condition.

Can be easily installed on all previous models of the Disston Chain Saw.

CRADLE BALANCED TAIL STOCK

Stronger, more compact, safer . . . Provides better leverage and easier manipulation in cut.

It is designed and shaped to fit the operator's arm . . . the fulcrum being at the front end of tail stock. Thus operator uses the entire body of the tail stock for maneuvering in cut. Note addition of abutment plate which allows upward bucking cuts to be made from the tail stock end.

Completely encased to protect operator's hands . . . no slots where fingers are exposed to cutting chain.

New simplified tensioning device meets individual requirements . . . all degrees, from a very loose chain to one that is 100% tight.

Can be quickly detached should saw get stuck in cut.

Because of simplicity of design, cleaning is easier and quicker.

Made of toughest grade of aluminum alloy and of permanent mold construction throughout, providing greater rigidity.

PLUS THESE DISSTON EXCLUSIVE FEATURES

- 11-h.p., 2-cylinder engine, designed specifically for Disston Chain Saw.
- Detachable Air Filter keeps dust from carburetor.
- Die Cast Engine Cylinders.
- Positive-acting, non-slipping, multiple disc clutch.
- Cutting Chain of specially heat-treated Disston Steel.
- Guide Rail of Disston Steel, reversible end for end, top for bottom.
- All Controls within easy reach of operator.
- Built-in Magna-Pull starter, no ropes to wind or lose.

Available NOW. Get in touch with your distributor.

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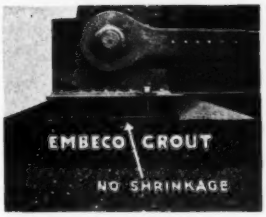
NON-SHRINK

EMBECO

CHECK CHART

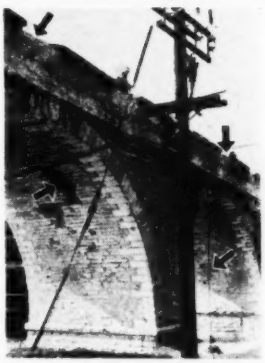
An Aid To Better Grouting and Reintegration

Embeco is used extensively by railroads because it eliminates all shrinkage in grouts and mortar. This non-shrink feature of Embeco, plus its high early and permanent strengths, provides exceptional results in the types of work shown below. If you will check the work you have to do, we shall be glad to send detailed information.



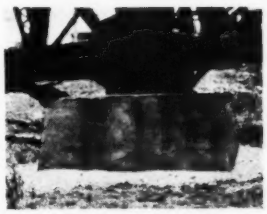
☐ **GROUTING BRIDGE SEATS AND TURNTABLES...**

By eliminating all shrinkage in grouts, Embeco assures good contact between grout and bed plate and creates a sound bearing surface that stands up through years of service.



☐ **REPOINTING OLD STONE STRUCTURES . . .**

Embeco is a specially prepared metallic aggregate, which when mixed with sand and cement produces a non-shrinking, perfect bonding, quick-setting mortar of great strength. Because of these characteristics it is ideal for repointing stone structures and similar work. (In bridge at left, parapets and inside of arches repaired with Embeco gunned mortar, stone work tuck-pointed.)



☐ **REINTEGRATING PIERS AND ABUTMENTS . . .**

After removing disintegrated concrete, a slush bond coat is applied. Pier is then repaired with Embeco non-shrink mortar. After waterproofing and decorative coatings, pier is ready for years of service.

☐ **APPLICATION OF GUNNED CONCRETE . . .**

Shrinkage of gunned concrete and mortar is eliminated by the use of Embeco. This assures a tight bond, checks cracking, prevents entrance of water and disintegration resulting from frost action.

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☐ **MASTERPLATE IRON-CONCRETE FLOOR . . .**

Masterplate provides an armoured surface produced by incorporating a specially prepared, pure, water-absorbent, graded iron in the *surface* of concrete at time of placing. Masterplate floors wear 4 — 6 times longer than plain concrete and are sparkproof.

BE SURE TO VISIT US AT BOOTH NOS. 107-8-9 NATIONAL RAILWAY APPLIANCES ASSOCIATION EXHIBITION Chicago March 15th to 18th

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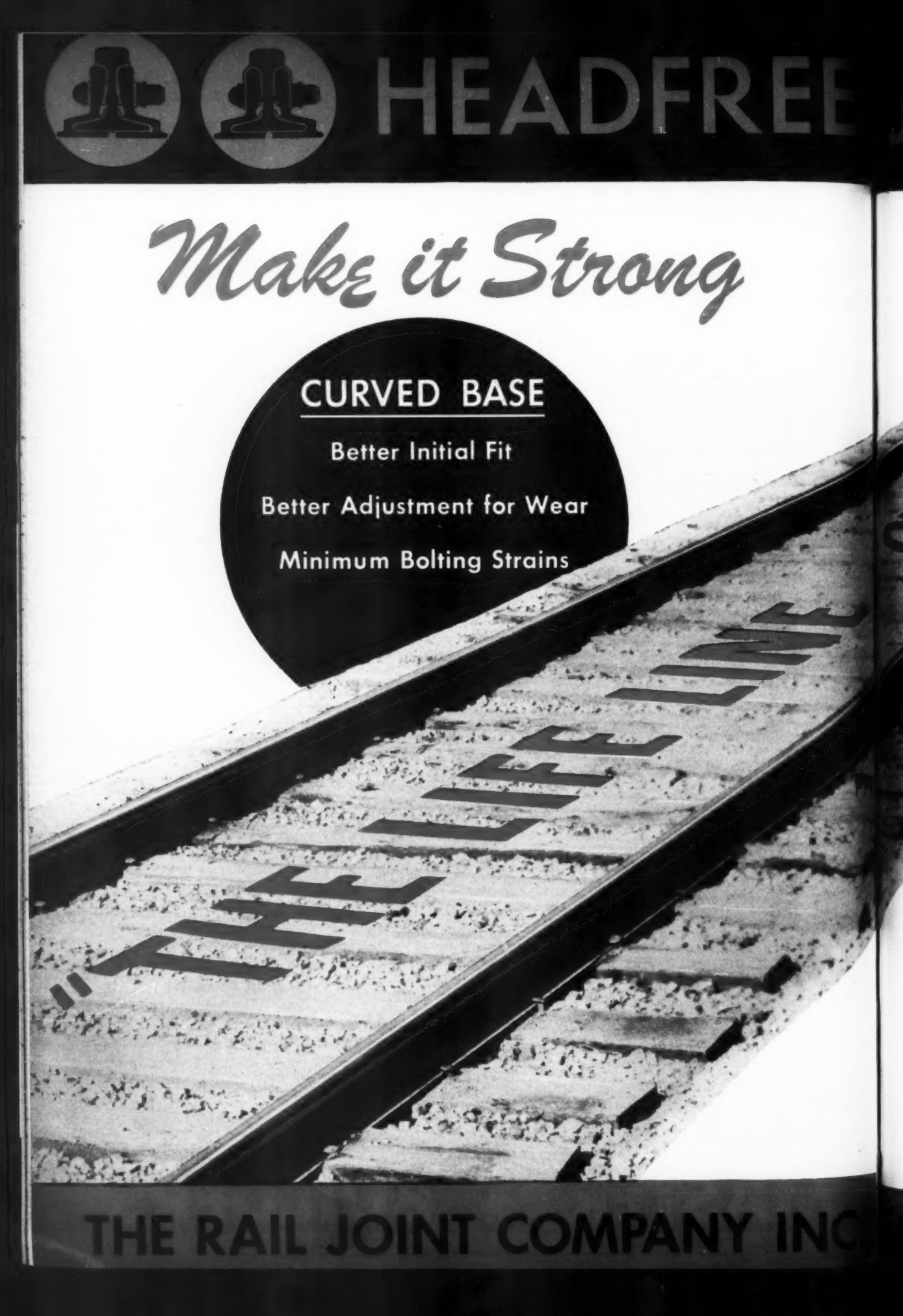
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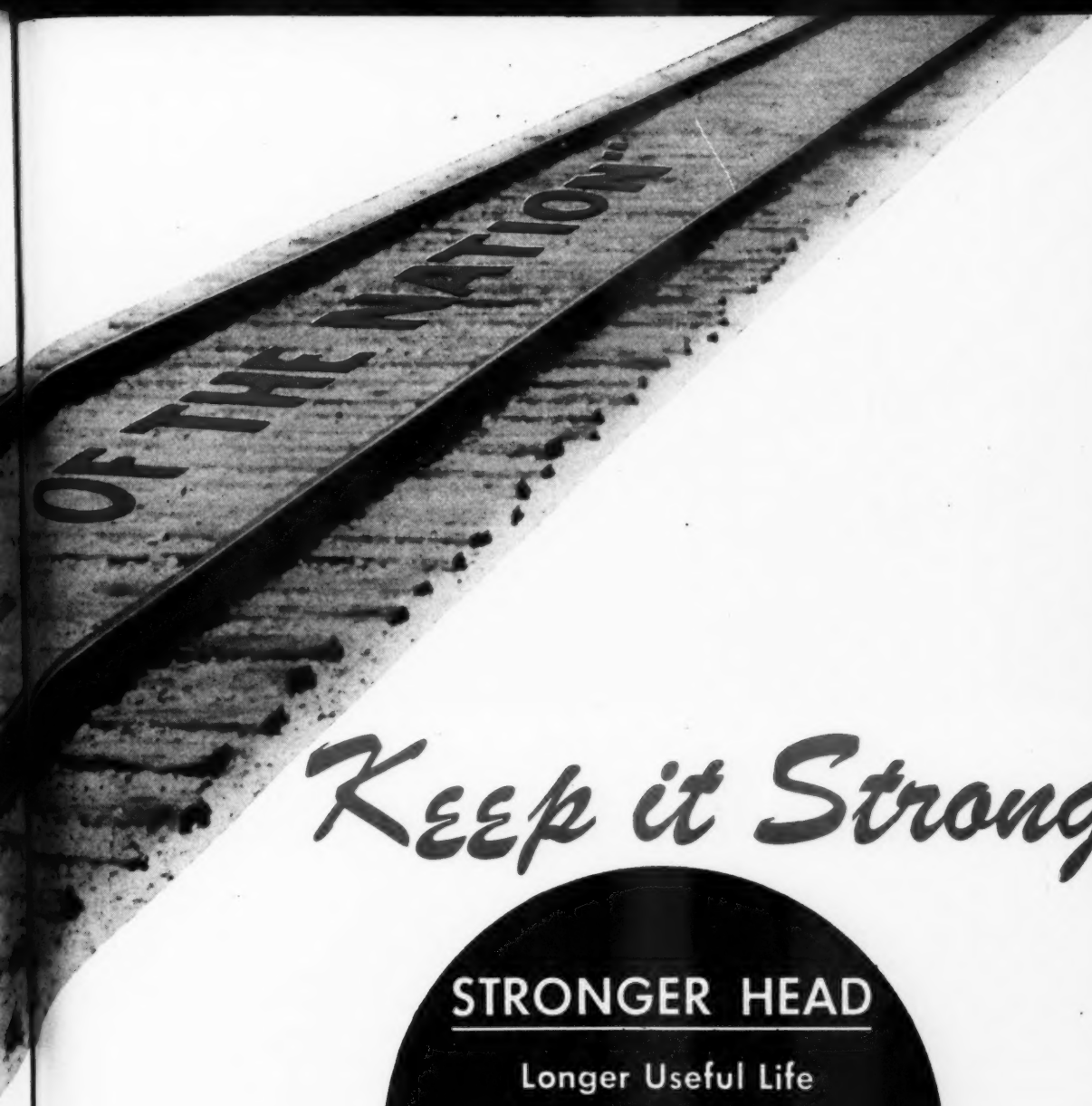

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Longer Useful Life

Less Fatigue Failures

Less Cost per Unit Strength

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Why drill a pipe full of holes?

It does seem odd to drill holes in a pipe intended to carry water. But this is one sure way to cut roadbed maintenance expense, and provide greater safety the year around.

Even the best of roadbeds cannot hold up on a soft, soggy foundation. Budgets take a beating—safety takes a nose dive. The permanent cure is to install ARMCO Perforated Pipe. It picks up harmful groundwater and drains it away safely.

Installing ARMCO Pipe is easy and economical. The work moves fast with unskilled labor. Long, easily-handled lengths are quickly joined by sturdy band couplers. Shifting soils and severe frost action are no hazards. Your subdrainage system has *proved strength* to resist crushing, cracking or disjointing under the impact and weight of heavy loads. Continued efficiency is assured.

You'll like ARMCO Perforated Pipe for complete railroad drainage systems or for taking care of trouble spots wherever they occur. Write for complete information. Armco Drainage & Metal Products, Inc., 1845 Curtis Street, Middletown, Ohio.

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ARMCO

ARMCO PERFORATED PIPE

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

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RAILWAY ENGINEERING AND MAINTENANCE — March, 1948

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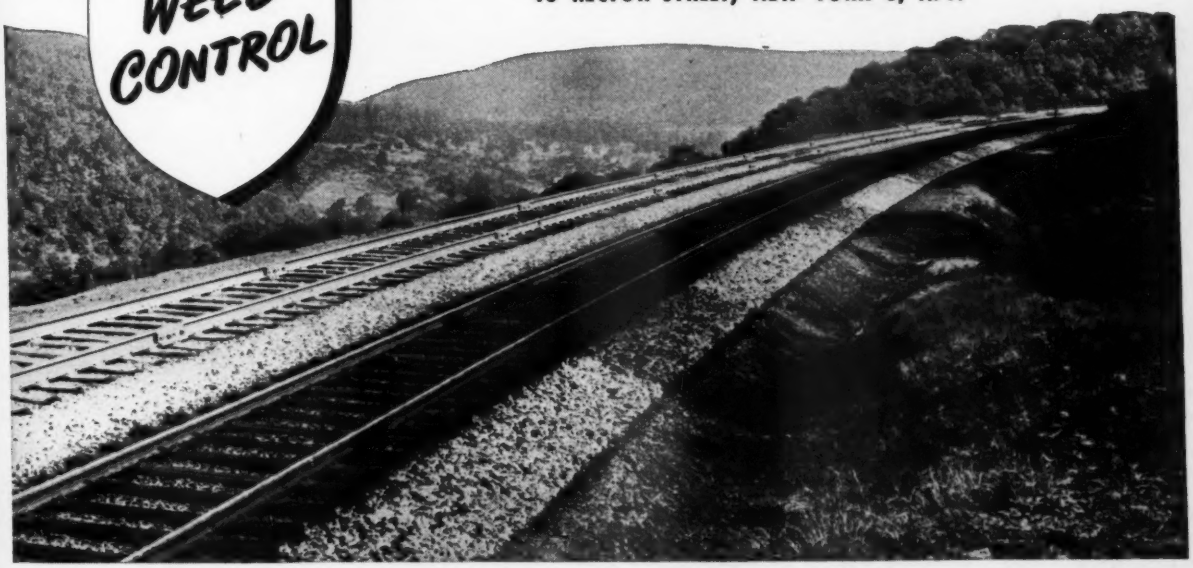

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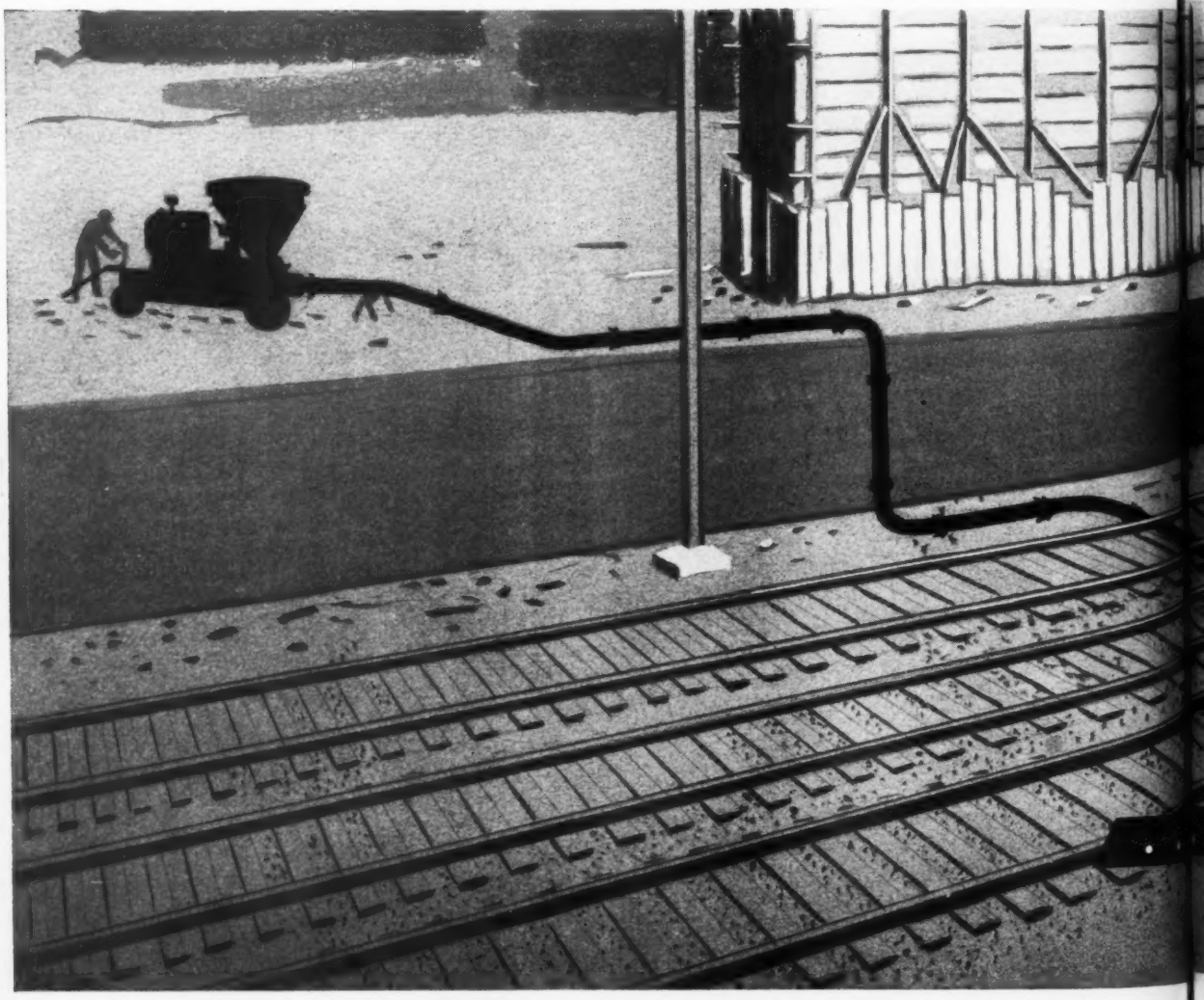

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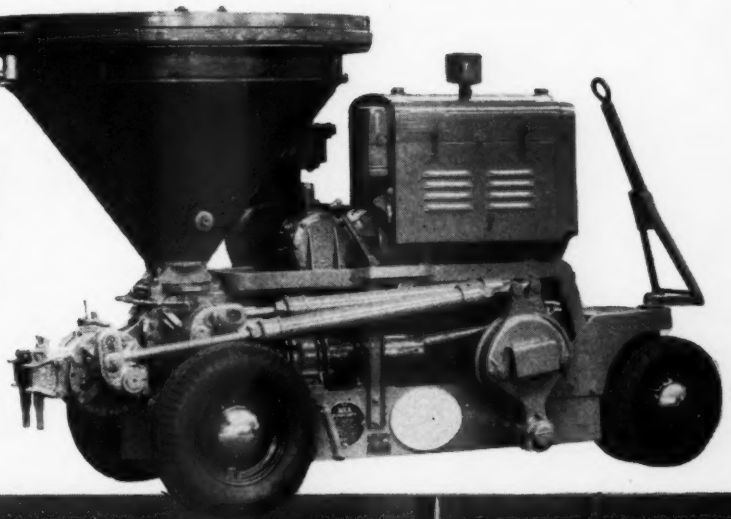

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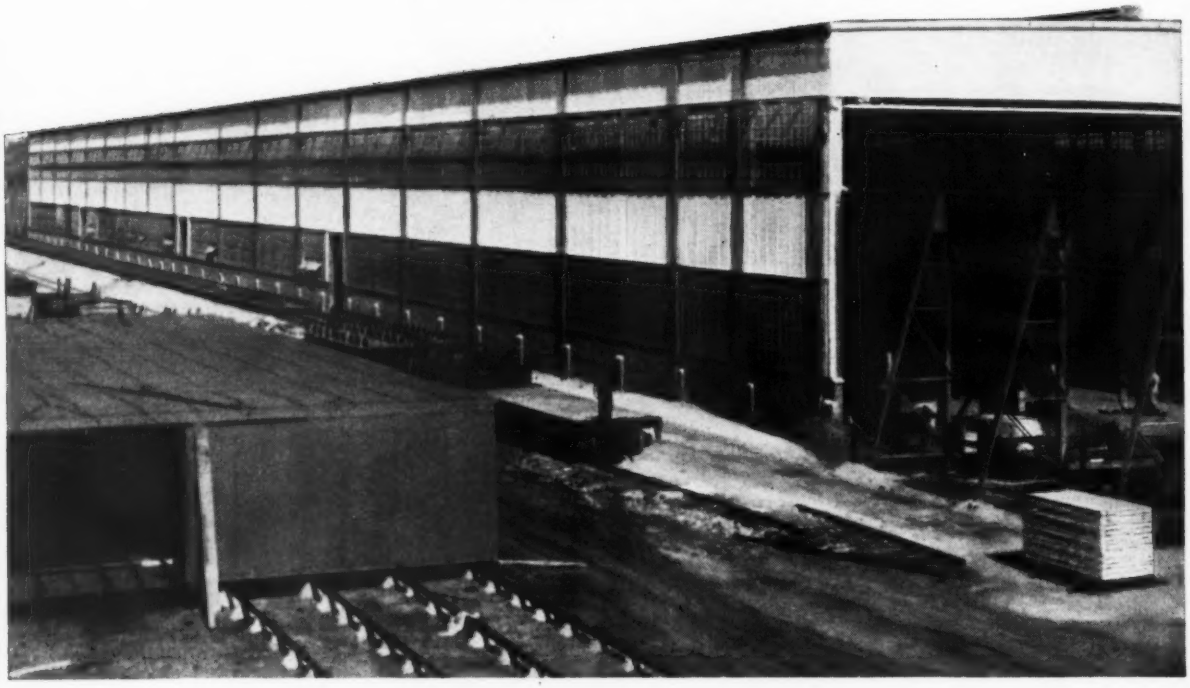

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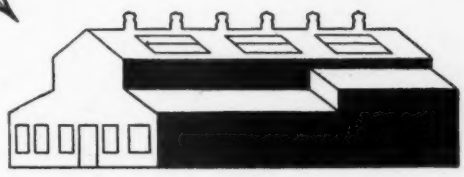

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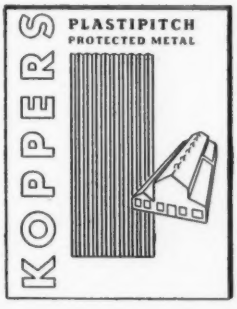

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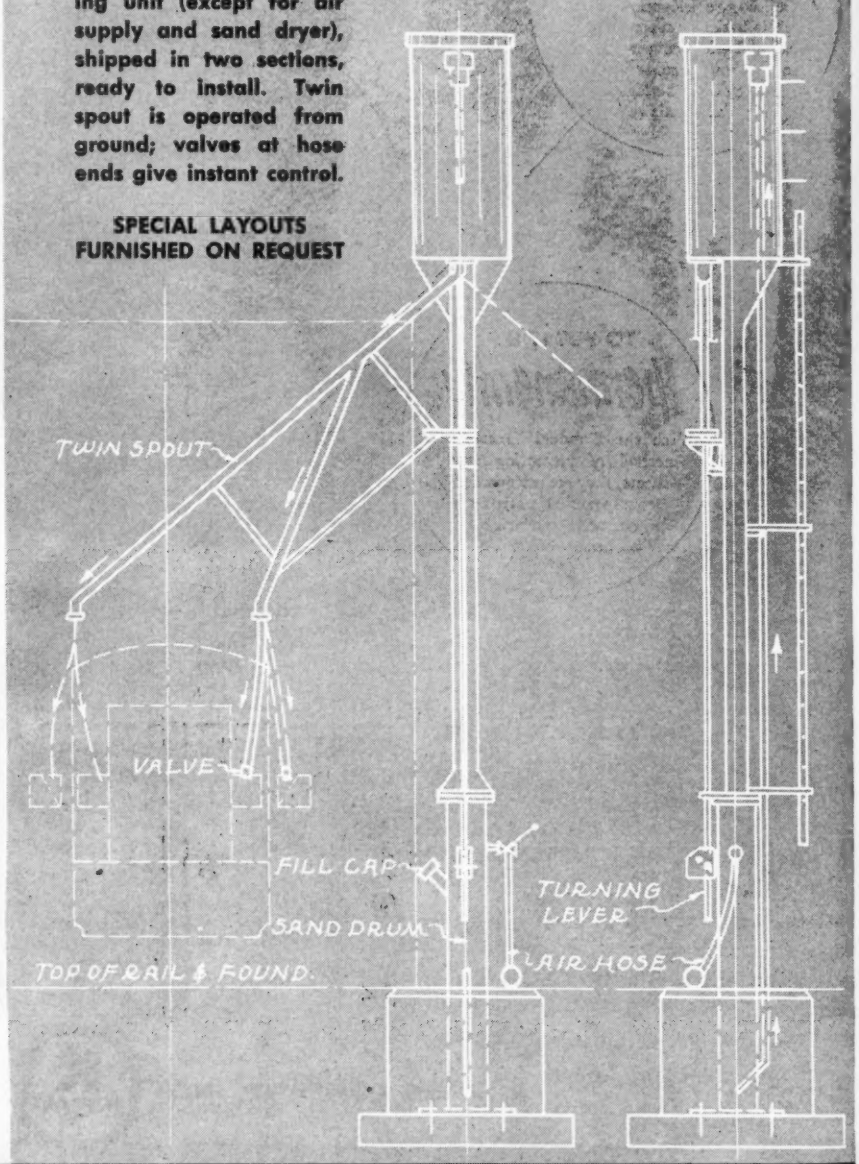

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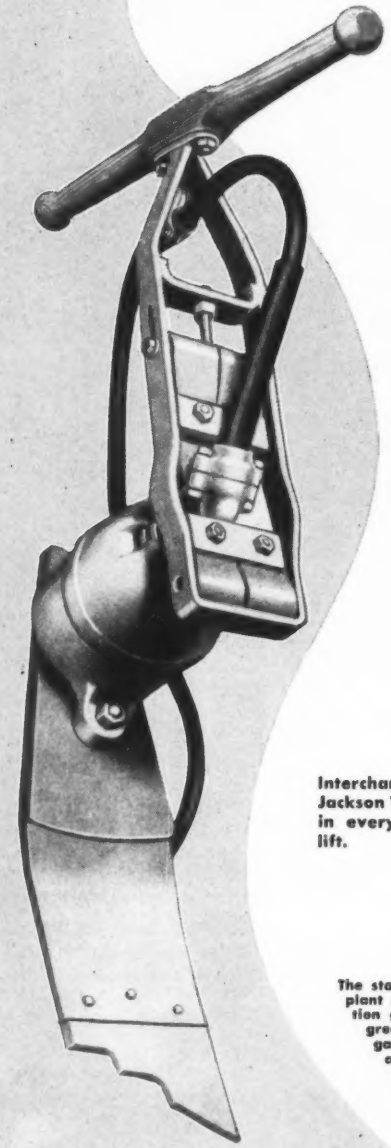

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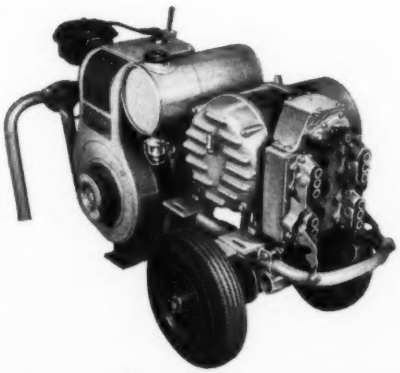

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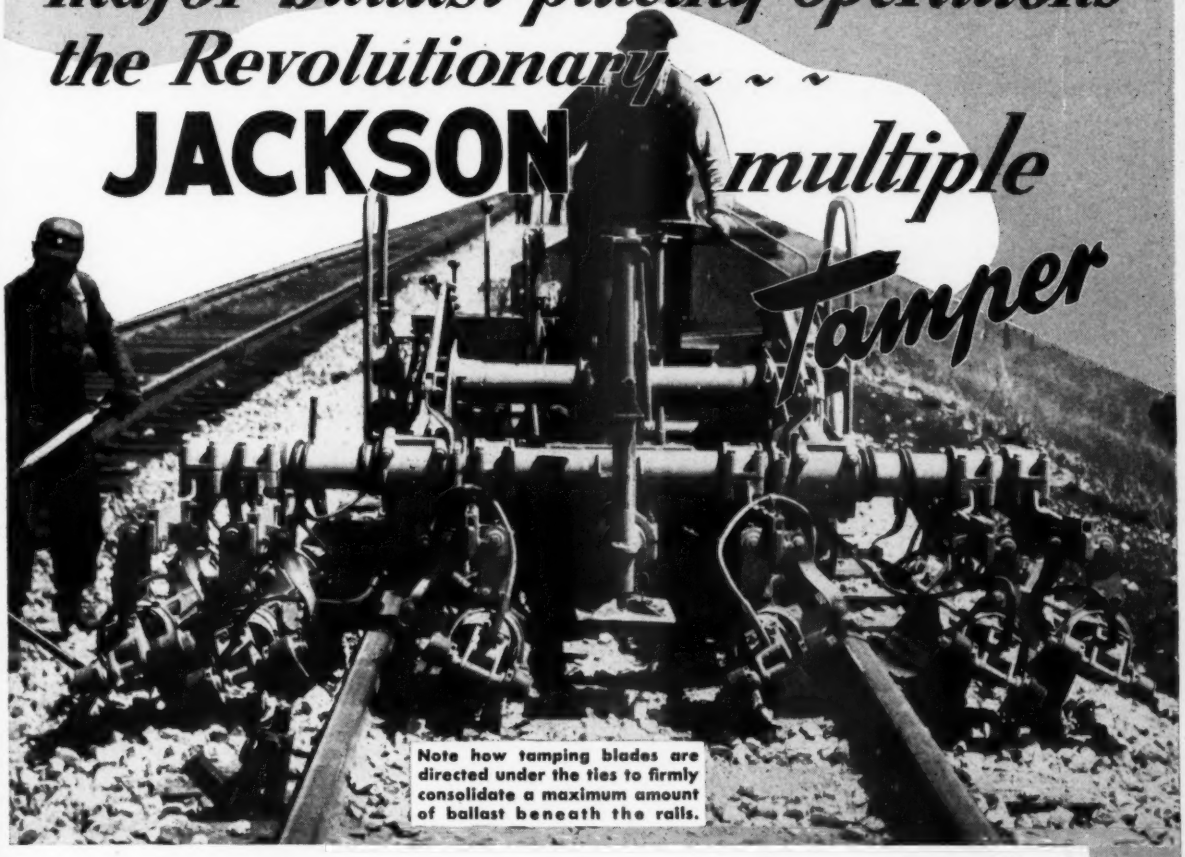

Note how tamping blades are directed under the ties to firmly consolidate a maximum amount of ballast beneath the rails.

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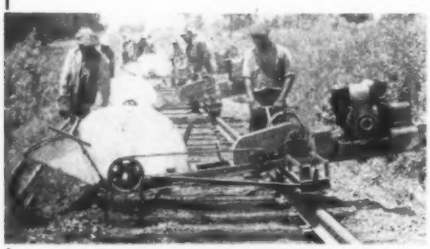

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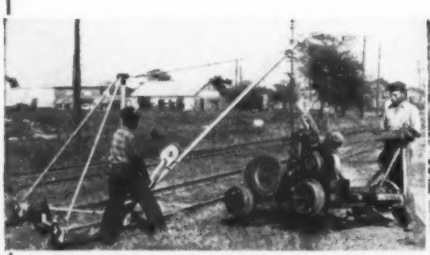

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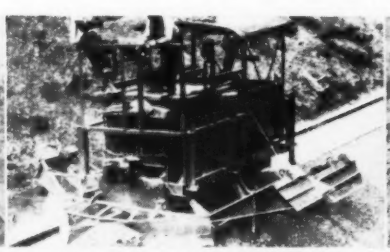
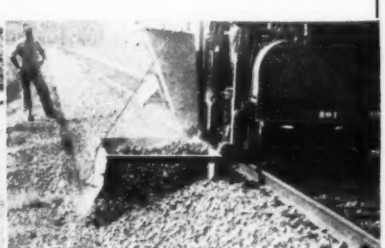


BALLAST PLOW REGULATING BALLAST AHEAD OF TAMPERS ON SURFACING GANGS



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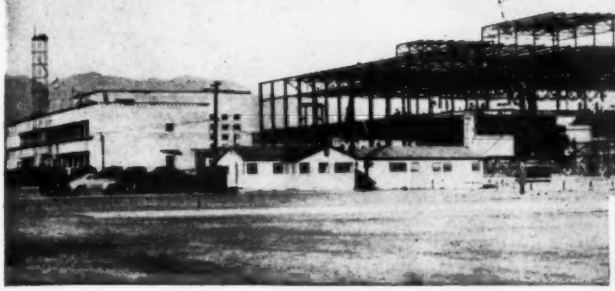

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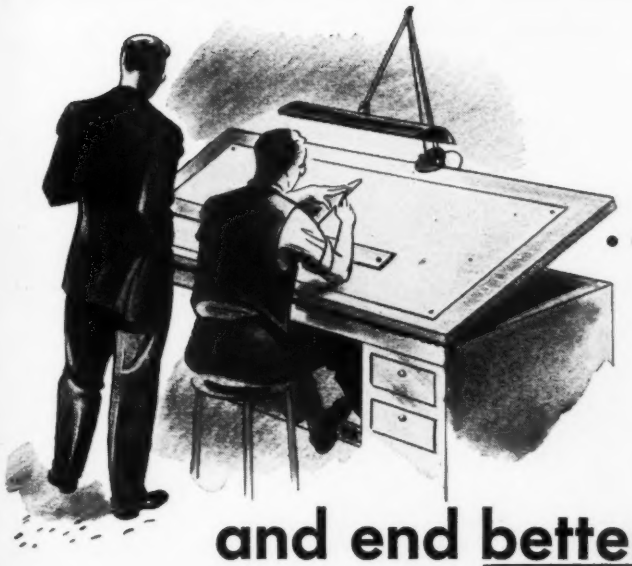

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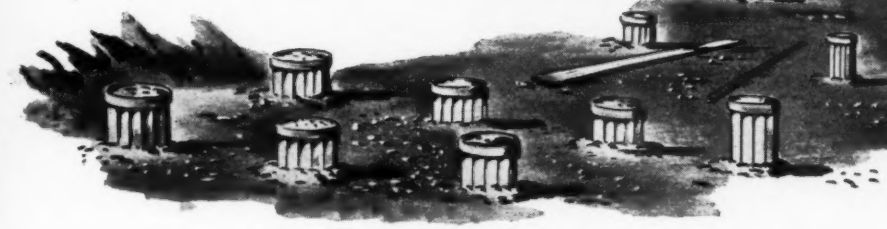

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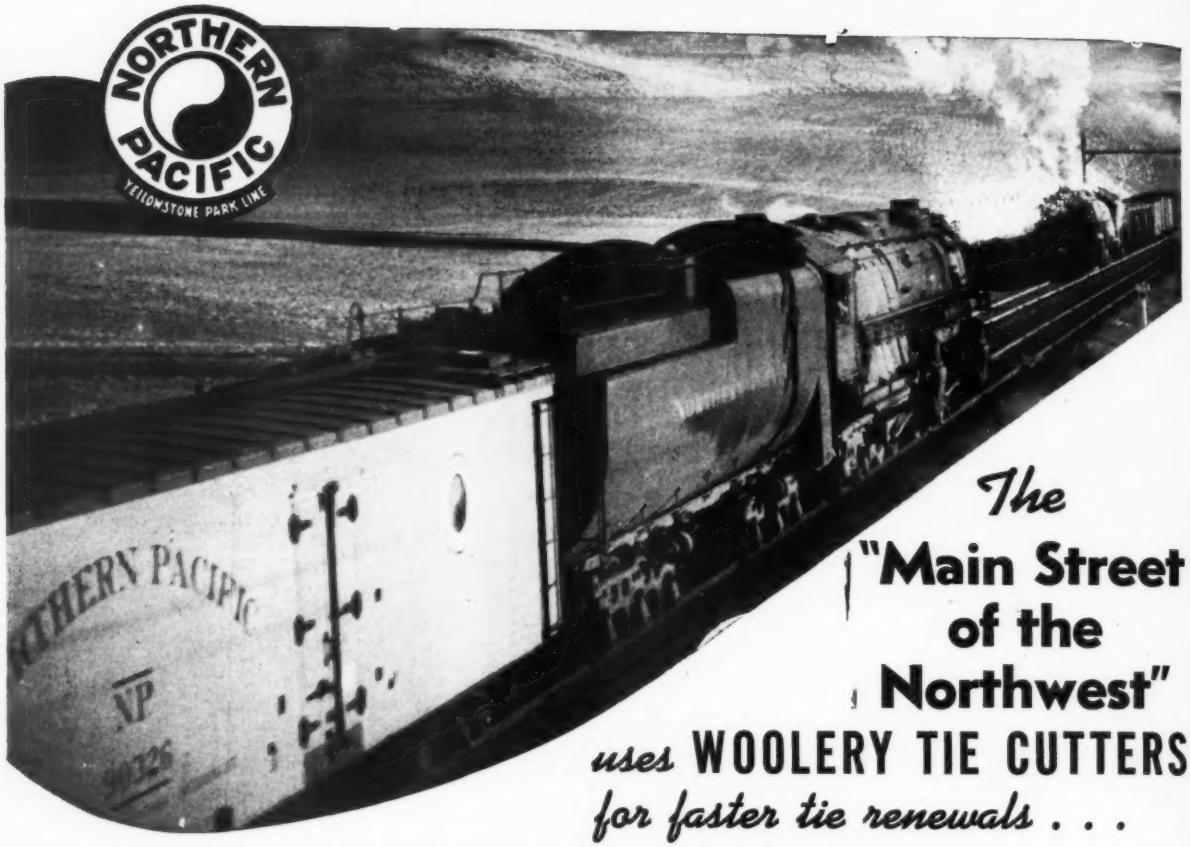

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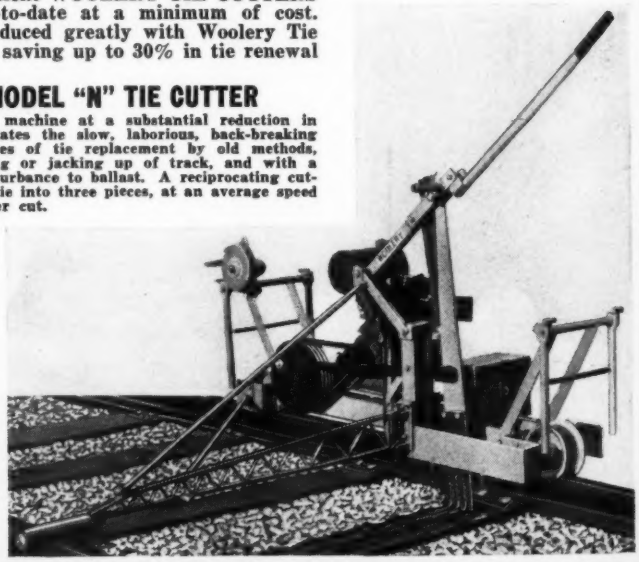
As powerful Northern Pacific locomotives help keep traffic on schedule along the "Main Street of the Northwest," so do modern efficient WOOLERY TIE CUTTERS assist in keeping their tie renewal program up-to-date at a minimum of cost. Since tie replacement time, labor and cost are reduced greatly with Woolery Tie Cutters, railroads are using hundreds of them and saving up to 30% in tie renewal charges.

THE MODEL "N" TIE CUTTER

is an improved machine at a substantial reduction in price. It eliminates the slow, laborious, back-breaking expensive features of tie replacement by old methods, without trenching or jacking up of track, and with a minimum of disturbance to ballast. A reciprocating cutting blade cuts tie into three pieces, at an average speed of 25 seconds per cut.

With the Woolery Tie Cutter, two cuts are made in the tie just inside the rail with about 20 to 30 seconds required for each cut.



The blade of the Woolery Tie Cutter operates with a reciprocating motion and can make from 50 to 100 cuts before sharpening is necessary.

The end sections of the tie are easily pried out with a bar, while the center section is removed by lifting out from between the rails. This results in practically no disturbance to the tie bed.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

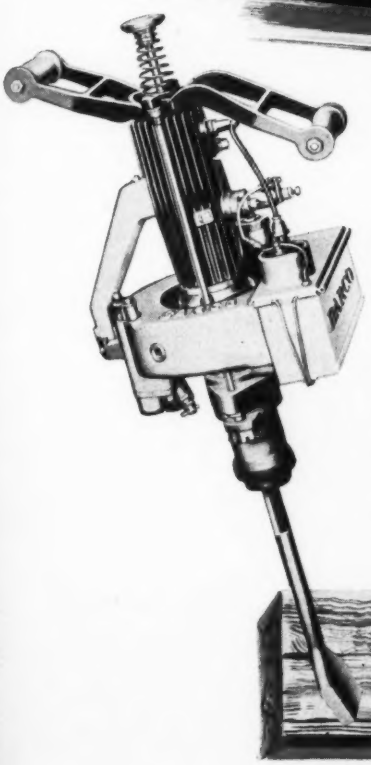
EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

HOW TO CUT MAINTENANCE COSTS . . .

A 10-Year Record!

MECHANIZE WITH A BARCO

With thousands of Barco Tytampers at work, railroads big and small are calling for more of these work-and-money savers. One maintenance-of-way engineer went a full month ahead of schedule by July when he added Barco. Ballast under a Barco-tamped tie is firmly and uniformly packed for the full width of the tie, and is less subject to unequal compression from passing trains. It's a 10-year record! For complete information write to Barco Manufacturing Company, 1805 Winnemac Ave., Chicago 40, Ill. In Canada: The Holden Co., Ltd., Montreal, Can.



BARCO UNIT TYTAMPERS

FREE ENTERPRISE — THE CORNERSTONE OF AMERICAN PROSPERITY

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SEE HOW

The

"INVISIBLE TRACKMEN"

DO THEIR STUFF!

BOOTH 165 - N.R.A.A. - CHICAGO

★ ★

Phenolex Silver Aluminum paint for these cars made with Reynolds Aluminum Pigment by Claronex Products, Inc., Brooklyn 22, N.Y.

GIVE your rolling stock... freight and passenger... a smart, "new look" with a coat of *Liquid Aluminum*. At surprisingly low cost you'll add gleaming silver beauty... long lasting protection for both wood and metal... and effective insulation.

Liquid Aluminum is aluminum paint made with Reynolds Pigment—the very foundation of quality. The soft brilliance of *Liquid Aluminum* reflects up to 75% of all radiant heat... can reduce summer temperatures inside cars as much as 15°. Think what that means in the transportation of perishables... in greater comfort for passengers.

You can also use *Liquid Aluminum* profitably on bridges, signal towers, switches, buildings and equipment of many kinds. You'll find it protects metal against rust... "armor plates" against erosion and abrasion of cinders, wind, water, snow and sleet... withstands sudden temperature changes.

Reynolds works so closely with leading paint manufacturers that when you buy a good brand of aluminum paint, the chances are it will be *Liquid Aluminum*. But it's worth checking back to make sure. Reynolds Metals Company, Pigment Division, 19 East 47th St., New York 17, N. Y.

REYNOLDS METALS

IT'S MORE THAN PAINT... IT'S...

REYNOLDS ALUMINUM PIGMENTS

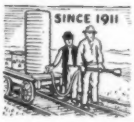
LIQUID ALUMINUM

Reynolds Pioneering Made Aluminum Competitive—*take advantage of it!*

What Counts Most in Successful Weed Control?

EXPERIENCE and KNOW-HOW rate highly in the specialized field of chemical weed control . . . as well as availability of proven chemicals.

YOU can benefit by—



Our background of over 35 years of railroad weed killing experience.

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Our wide variety of weed killing chemicals for specific types of weeds and conditions.

Our strategic plant locations throughout the country to facilitate distribution at minimum cost.

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Why not write now for recommendations based on YOUR weed problems? Early planning for your 1948 control program will insure chemical deliveries at the proper time, for the most economical and thorough weed killing job.

CHIPMAN CHEMICAL COMPANY, INC.

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HI-BALL SWITCH HEATERS ARE PREFERRED

- More Economical Installation
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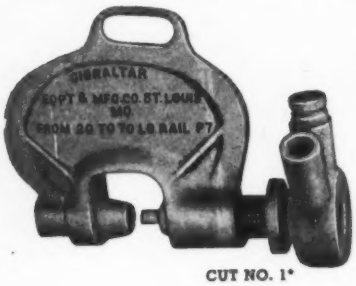
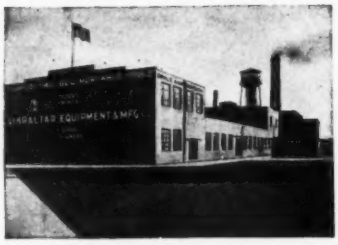
THE PORTABLE TRACK TOOL & EQUIPMENT PEOPLE — P. O. BOX 304, ALTON, ILLINOIS.

*In Time of Peace Cut Your L-M/Cost, with "GEMCO TRU-BLU" Tools and Equipment!



CUT NO. 1*



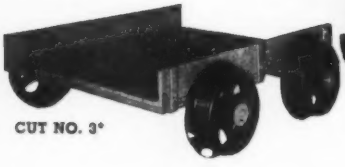
THE HOUSE THAT QUALITY & SERVICE BUILT!

MULTIPLE LEVERAGE SUPER PUNCH

CUT NO. 2*

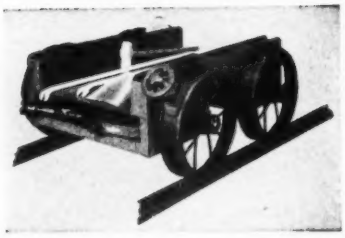
RAIL LEVELER*

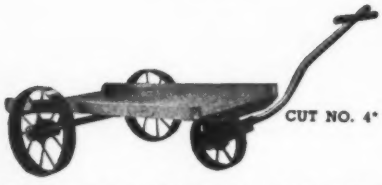
THE FOUNDRY & FORGE SHOP THAT OUR "GEMCO TRU-BLU" TOP QUALITY BUILT



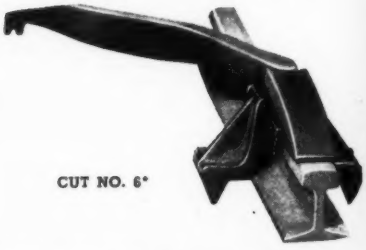
CUT NO. 3*

CUT NO. 5*





CUT NO. 4*



CUT NO. 6*

*MEET & BEAT L-M/COST--WITH "GEMCO" TOP TONNAGE TOOLS

YOU WIN THE LOW COST FIGHT FOR BIGGER TONNAGE BY USING THE MOST EFFICIENT TRACK TOOLS YOU CAN GET—EVERY "GEMCO TRU-BLU" TOOL A GEM OF ENGINEERING DESIGN FOR TOP EFFICIENCY, ECONOMY, DURABILITY, AND SAFETY!

*Write for full data on all tool, track, accessory, special equipment, casting and forging requirements, etc. "Termi-Tox" termite control materials.

***L-M MEANS LAYING-MAINTENANCE OF TRACK. GEMCO TRU-BLU MEANS TOP TONNAGE TRACKS!**

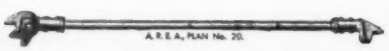
CUT NO. 1: Ratchet Type Rail Punch—light-weight but durable for hard service; for holes from ½" to ⅞". Also supplied in Standard and Multiple Leverage Super Punch Types. (See right, top, of page.) CUT NO. 2: Ratchet Type Rail Bender-Straightener—Timken Bearing equipped models for 8 to 160-lb. rail; all sizes also supplied in Standard Model. Special ratchet assembly gives faster, easier operation. Long-lived; maximum strength with light weight. (Write for data.) CUT NO. 3: Economy Special Supply Car—Seasoned oak or steel body, for any gauge track; heavy-duty steel or cast wheels with cage-type roller bearings. We also supply Standard Light Weight Trackmen's and Drillers' Tool and Supply Car, all-steel construction with double deck for additional carrying capacity. Extra heavy-duty models also supplied in both types, as well as Special Light Weight Car-Steel construction, side compartments, single deck, etc., etc. (See Cut No. 5.)

CUT NO. 4: Standard "Three Wheel" Tool and Supply Car for trackless mine haulage, general utility service above or below ground—supplied in Economy Special, Special, Standard or heavy-duty types. Heavy-gauge steel reinforced construction; flat-rim roller-bearing steel wheels; new front wheel arrangement is self-cleaning, and adjusting. CUT NO. 5: Tool & Supply Cars for Track Layers, Drillers, Shot Firers, etc. All track gauges. Heavy duty pressed steel or cast wheels with cage-type roller bearings. Send for full data on cars and also on the new Rail Leveler units pictured above—level up "hogged" rails. CUT NO. 6: "Gemco" Rerailer—Efficient; flexible; has tie-lock feature locking the unit on the rail to prevent slipping and accidents in rerailing. Swivel design of skid allows rerailment from any angle, with a minimum of time and effort. Light weight: rugged; top durability.

Modernize with "Gemco"

CAR MOVER

TRACK LEVEL



TRACK GAUGE

TRACK DRILL

"Gemco Tru-Blu" Track Tools Have the Strength of Gibraltar!

Efficienize with "Gemco"

For additional information, use postcard, pages 231-232

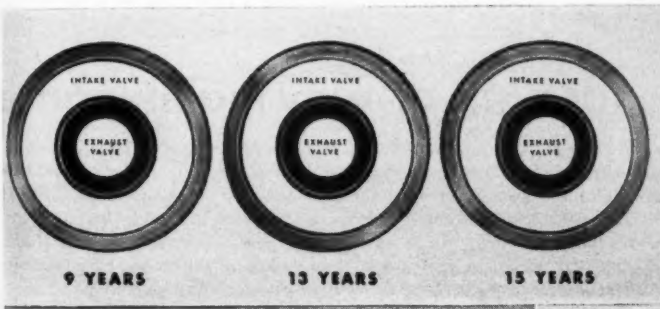
Davey Valves assure "PERMANENT PEAK" COMPRESSOR EFFICIENCY without cleaning . . . or replacement

If you're using ordinary compressors, check your records. You'll find that air output declines as machines become older—*as valves carbon.* Also, that your biggest maintenance cost is for cleaning and replacement of valves.

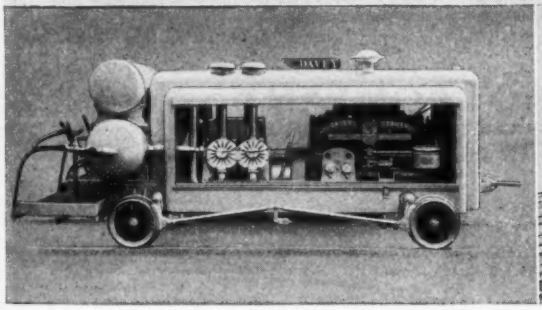
That's why you should investigate Davey—today! Every Davey Compressor is equipped with *Permanent Peak Efficiency* lifetime valves. Leakproof construction, extra large size and perfect seating of these valves, coupled with Davey's special alloy compressor heads, assure constant full volume of air . . . longer, more economical compressor life.

Davey Permanent Peak valve efficiency is the result of providing a ready path for heat removal through aluminum alloy cylinder heads. These heads transmit heat through their mass three times as fast as cast iron. *Necessity for removing cylinder heads to clean carbon is eliminated.* Operating tools continue to function at full capacity.

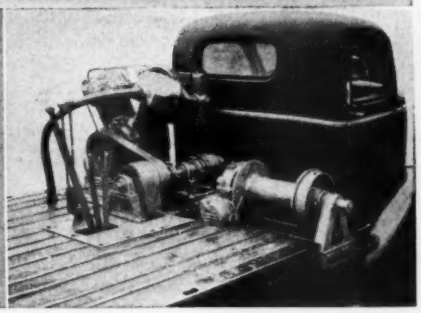
P & P-116-D



After 9-13-15 years of continuous service the intake and exhaust valves (shown at left) were removed from three Davey Compressors. Peak efficiency condition is attested by absence of carbon or pitting. Note how valves have seated perfectly — absence of any signs of leakage.



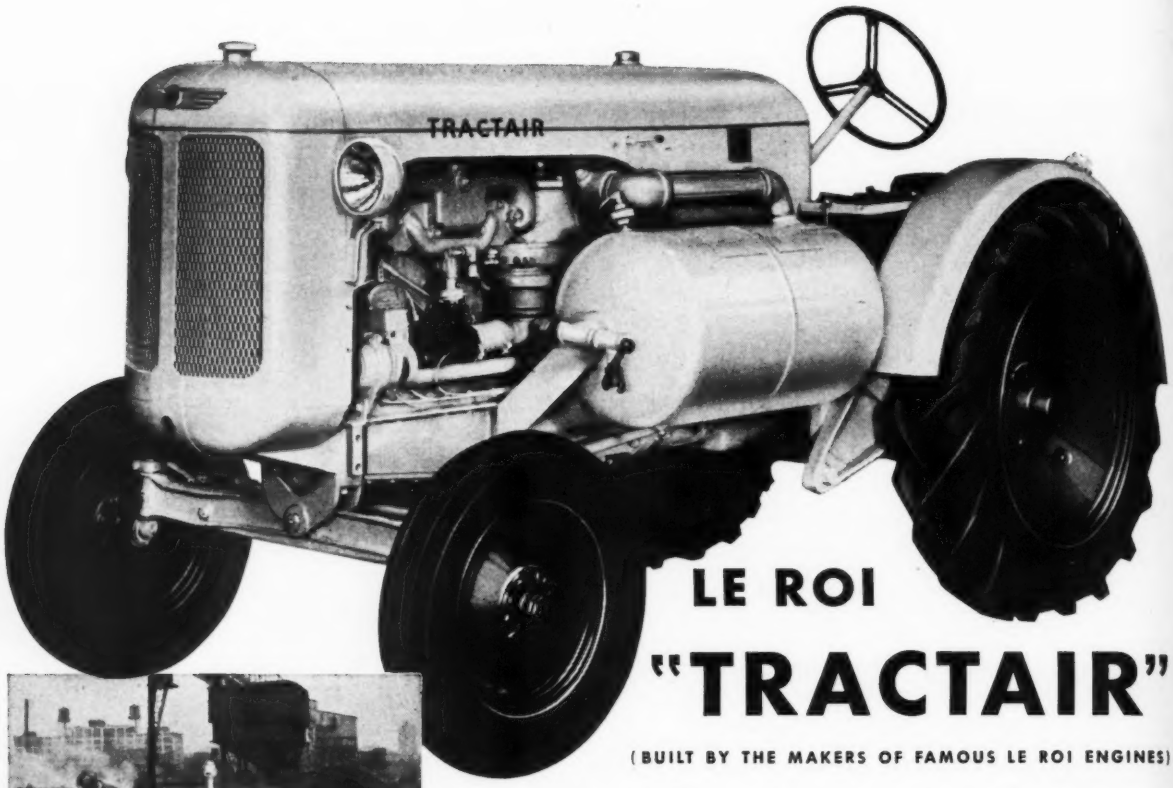
Davey Air Chief—Model 315—self-propelled railcar. Equipped with railway type brakes and operators' platform. Air motor with clutch gives forward and reverse speeds of 4 to 10 m.p.h. Because of power reserve, can be used to push or pull other equipment. Transverse wheels.



Davey Auto-Airs are ideal for maintenance of way. They can be used in locations where crawlers have been used . . . travel at higher speeds . . . carry their own tools. Compressor is driven from truck engine through Davey Power Take-off.

DAVEY COMPRESSOR CO.
KENT, OHIO

DAVEY



LE ROI "TRACTAIR"

(BUILT BY THE MAKERS OF FAMOUS LE ROI ENGINES)

speeds right-of-way maintenance

The Le Roi "Tractair" is a self-propelled, pneumatic-tired tractor-compressor that combines all of the features of an efficient, mobile 105 c.f.m air compressor with the flexibility and utility of a 35 h.p. wheel tractor. All pneumatic tools used in railroad maintenance that can be operated from a 105 ft. compressor can be handled efficiently by the "Tractair." The large pneumatic tires are equally as adaptable to adverse right-of-way conditions as they are to paved terminal facilities.

A complete line of interchangeable "front end" equipment such as loader, snow plow, rotary broom, back-fill blade, is now available.

For complete details and new literature write to the Railroad Sales Dept.

"Tractair" mobility is ideal for station platform maintenance

"Tractair" with backfill blade cleans up.

LE ROI COMPANY
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NATIONAL RAILWAY APPLIANCES ASSOCIATION
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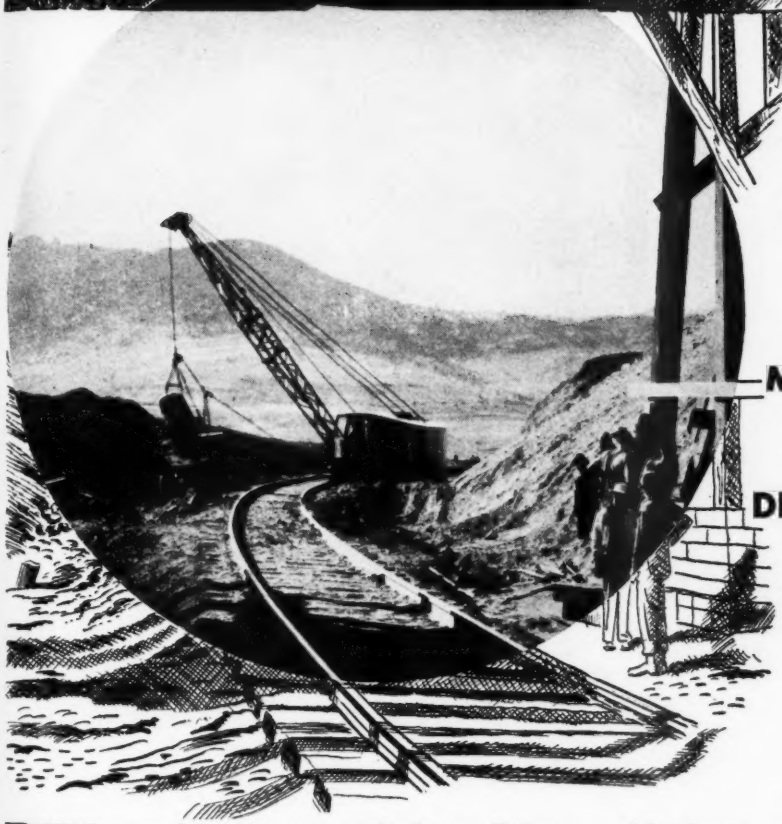
MARCH 15 to 18th, 1948
Booths 110 and 111

T-3A

Le Roi Tractair equipped with hydraulically-operated heavy-duty loader. Payload capacity of this handy loader is 1200 pounds. The boom swings 180 degrees. Loading is from the forward position. After load is dumped, bucket automatically returns to loading position.

LORAIN PERFORMANCE

gets right-of-way



NEW TL-20

MAKES LORAIN No. 2

for

DENVER & RIO GRANDE WESTERN R. R.

RISING costs have put new emphasis on efficient maintenance of way operations. That's why Lorain No. 2 is on the job for Denver & Rio Grande Western. Previous experience with Lorain equipment gave proof of its ability to handle a wide variety of jobs economically.

And they have a real "go-getter" in this new TL-20 dragline. The turntable features "unit assembly" for high efficiency power transmission, simplified design and easier maintenance. The unit pictured is mounted on 2-speed chain drive crawler, but is also available on any one of 9 different highly mobile rubber-tire mountings. Interchangeable boom equipment permits quick change to shovel, crane, clamshell, dragline or hoe.

Whether its new construction, maintenance-of-way or yard work, here's a unit in the ½ yd. class that will keep the job rolling at a record pace. For information on this and larger shovels and cranes in the complete Lorain line, write or call your local Lorain distributor.

THE THEW SHOVEL COMPANY • Lorain, Ohio

TL-20 FEATURES

- Independent Rope Crowd Shovel
- 2 Crawler Speeds (Standard)
- Unit Assembly—Easier Service
- 5 Identical Clutches
- Operating Lights (Standard)
- "Full circle" Crawler Steering
- Anti-Friction Bearings
- Drop Forged Crawler Treads
- Starter and Generator (Standard)
- 9 Rubber-Tire Mountings Available
- Interchangeable Parts
- All-Purpose Crane Boom

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CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

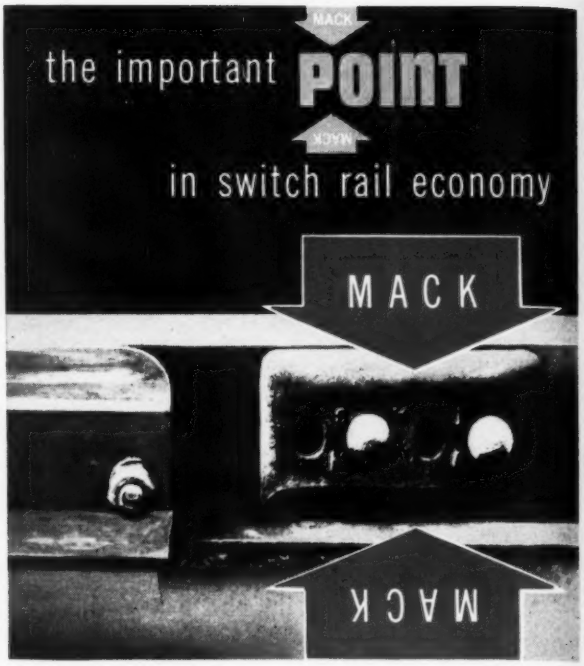
These washers are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

We control every step of their manufacture—from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

BEALL TOOL DIVISION *of Hubbard & Co.*
EAST ALTON, ILL.

Specialist Manufacturers of Spring Washers

BEALL Hi-Duty
SPRING WASHERS
MADE ESPECIALLY FOR RAILROAD SERVICE



MACK reversible switch POINT protector

- As originally applied, MACK lengthens Switch Rail Life 4 or 5 Times.
- When MACK wears down, reverse it and it lengthens Switch Rail Life 4 or 5 Times More!

So, your Switch Rail Life is actually lengthened 8 to 10 times!

. . . that's the POINT

Visit Us at Booths 59 and 60 N. R. A. A. EXHIBITION
International Amphitheatre • Chicago • March 15-18 inclusive

R-2699

Maintenance Equipment Company
RAILWAY EXCHANGE BUILDING • CHICAGO, ILLINOIS

These photos courtesy of—1. Union Pacific—Chicago and North Western Ry. Co. 2. Norfolk and Western R. R. Co. 3. Canadian National Railways. 4. New York, New Haven & Hartford R. R. Co.

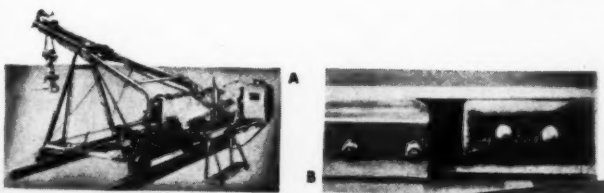
MECO CURVE-RAIL Lubricators

Safety with Savings!

Today's high-speed trains operate with much greater Safety when curves are protected by MECO-Lubrication. This is in addition to MECO'S Long-range Economy; the Two to Four Times Longer Life of Curve Rail, both present *and* future; and the reduced wheel-flange wear. Installing MECO truly brings *Safety with Savings!*

Visit us at Booths 59 and 60, N. R. A. A. Exhibition, Chicago, March 15 to 18, incl.

N. R. A. A. Exhibition



A—Power Rail Layer Requires No Train Orders.
B—Mack Reversible Switch Point Protectors make switch rails last 8 to 10 times longer.

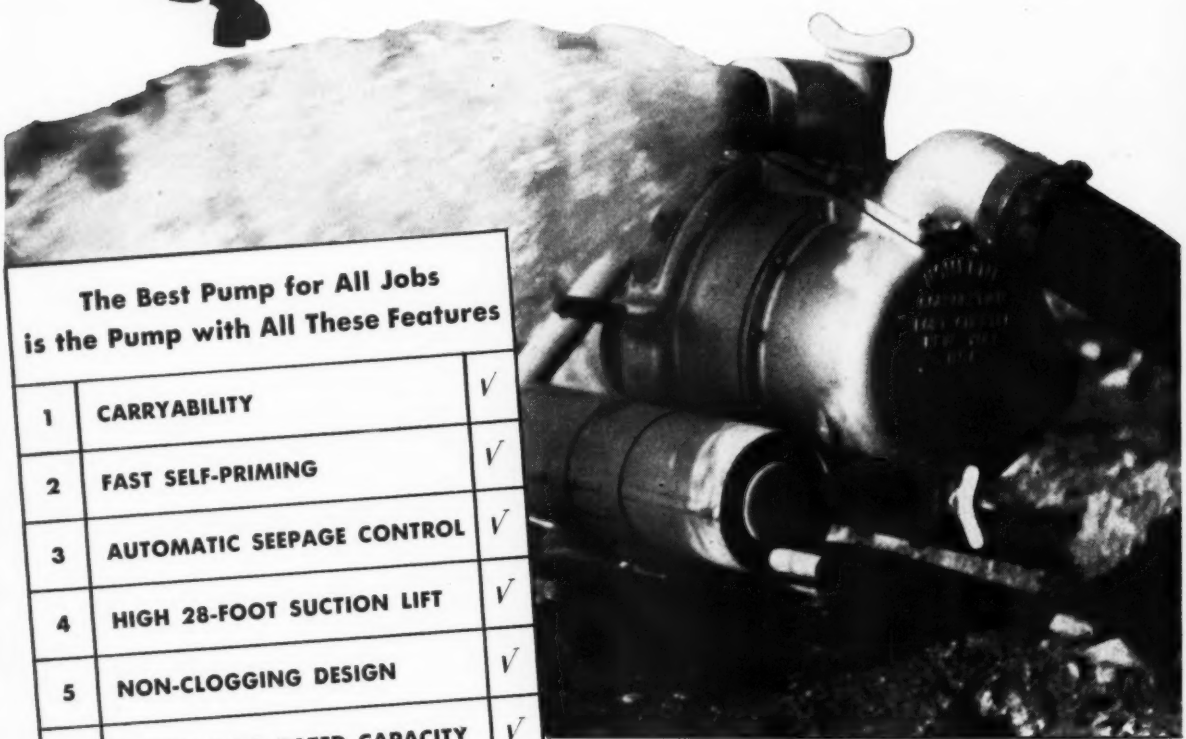
★ **Maintenance Equipment Company** ★

RAILWAY EXCHANGE BUILDING • CHICAGO 4, ILLINOIS

R-2431R

Homelite Carryable Pump ...with 9 Big Features

It weighs only 85 pounds... complete with built-in high-powered gasoline engine... and when it comes to performance, its nine big features are nine big reasons why a Homelite *Carryable* Pump is the best pump for all jobs... *your* jobs.



The Best Pump for All Jobs is the Pump with All These Features		
1	CARRYABILITY	√
2	FAST SELF-PRIMING	√
3	AUTOMATIC SEEPAGE CONTROL	√
4	HIGH 28-FOOT SUCTION LIFT	√
5	NON-CLOGGING DESIGN	√
6	MAINTAINED RATED CAPACITY	√
7	DISCHARGE PRESSURE	√
8	DEPENDABILITY	√
9	SIMPLE DESIGN AND OPERATION	√

See for yourself

Write today for our new illustrated bulletin No. L-503 that tells the *complete* story and shows how you can get faster, better pumping with Homelite *Carryable* Pumps.

HOMELITE

CORPORATION

203 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

MANUFACTURERS OF HOMELITE *CARRYABLE* PUMPS · GENERATORS · BLOWERS · CHAIN SAWS

HERE'S ONE OF THE MOST IMPORTANT FIRES YOU EVER SAW!

BECAUSE IT MAY HELP YOU TO PREVENT THEM!

It may sound like a miracle . . . *but fire-retardant wood is here!*

Koppers fire-retardant wood demonstrates its effectiveness in the tests pictured . . . and has several times confirmed it in fires in plants and factories built of the material. These fires were speedily brought under control, with only minor structural damage, *because of the protection given by Koppers fire-retardant treatment.*

Engineers have been quick to recognize the service and economic advantages of Koppers fire-retardant wood, and have applied it in floors, roofing, sheathing and structural members of industrial buildings, garages, airplane hangars, munitions plants, docks and warehouse buildings, railroad engine houses, and other similar structures. Koppers CZC(FR) treatment has a valuable *plus* advantage, *for it also fortifies the wood against decay and termite attack.* Color and paintability are not harmed by the odorless CZC(FR) treatment.

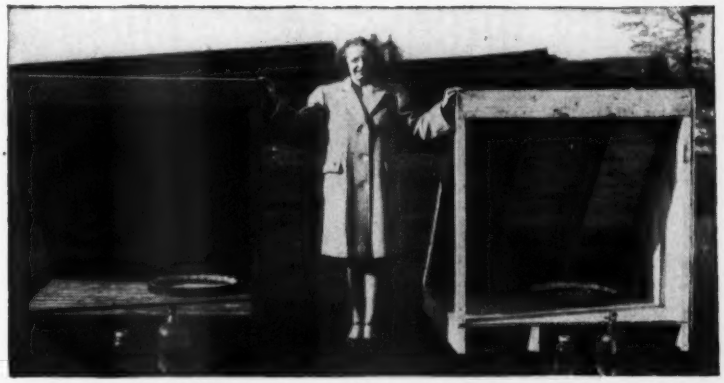
The nation's fire losses in the average year total almost half a billion dollars. Losses can be saved, building contents protected, and fire-control efforts aided, through the use of Koppers fire-retardant wood. In its broader utility and multiplied benefits, Koppers fire-retardant wood is practically a *new* structural material. It opens new fields and opportunities for the world's oldest, most versatile, most easily worked, and most desirable structural material.

"Koppers Fire-Retardant Wood" just off the press. Filled with interesting, helpful information. Ask for a copy.

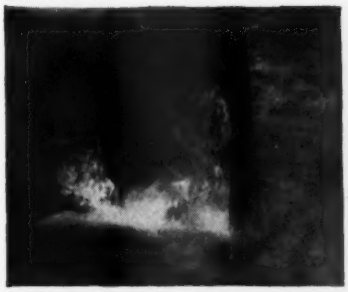
K KOPPERS

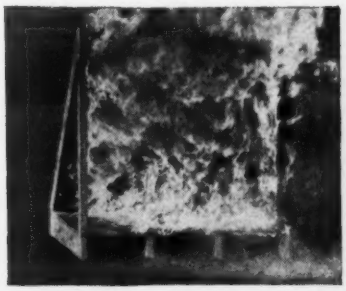
PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC.
PITTSBURGH 19, PENNSYLVANIA



Test structures built of Koppers fire-retardant wood (left) and untreated wood (right) ready for the fire test. Five quarts of kerosene, placed in pans, furnishes fuel for each blaze.





Both structures are quickly enveloped in flame. Treated structure resists fire, but untreated one encourages it, contributes fuel to the fire.

After twenty-two minutes the untreated structure, still burning, is collapsing. Note that in the treated structure, the fire stopped when the fuel burned out.

(Above) Continued burning reduced the untreated structure to ashes.

(Left) The treated structure was charred . . . but retained its integrity and strength, as the 800 pound load shows.

Digging ditches to Blueprint Specifications

Exacting "specs" ca'led for by blueprint are followed easily by operator with Gradall hydraulic "Arm-Action".

With ½-yard ditching bucket Gradall moves and loads at rate of 40 cu. yards per hour. Note clean precision.

Full 360° swing lets Gradall boom extend easily to dump spoil into waiting gondolas.

Gradall's compact design is ideal for working under low wires, around track-side obstacles.

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N-348

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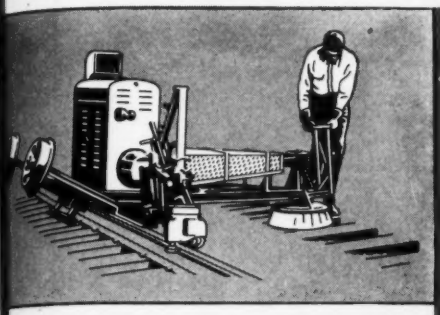
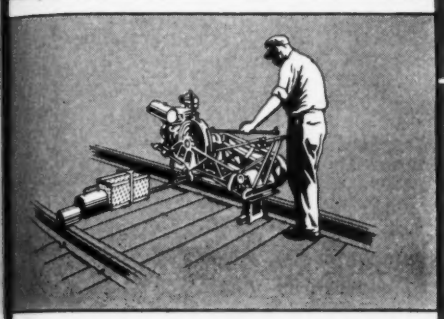


ADZING MACHINES

Provides the means of keeping ballast in step with today's track maintenance standards. All level and in same plane.



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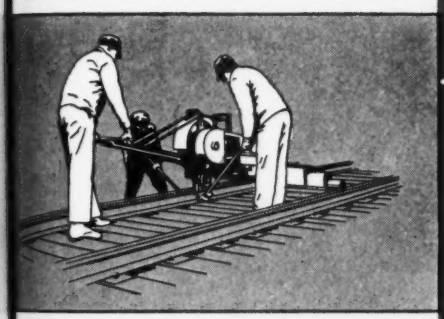
By gaining speed and power this machine speeds up relaying and reduces the cost of the entire operation.

TRACK WRENCH

Improves rail joints by restoring tightness. Prolongs rail life and makes better riding track.



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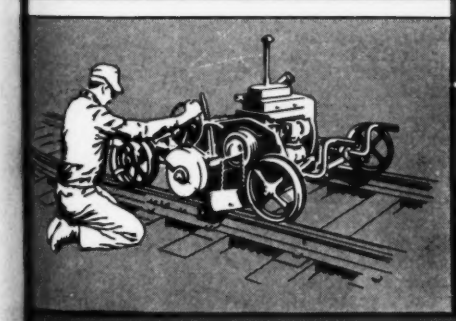
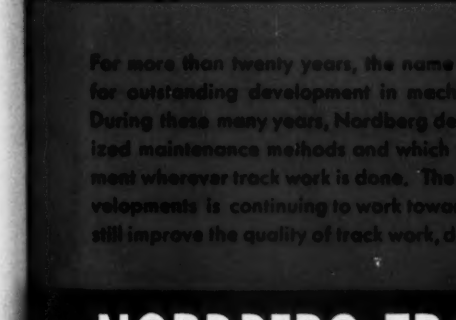


SPIKE HAMMER

This machine will drive 900 spikes an hour, all straight and vertical to the tie.

POWER JACK

For those times when engineers decide track is raised on ballasting and surfacing jobs.



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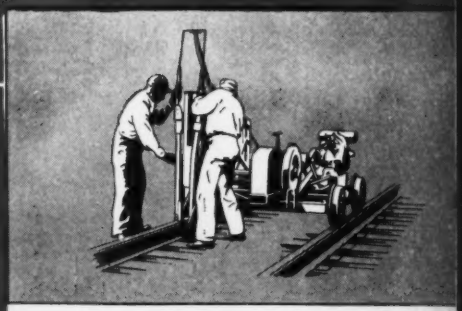

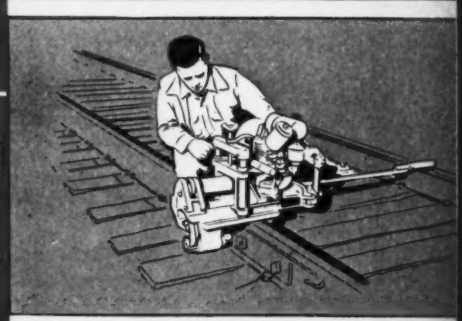

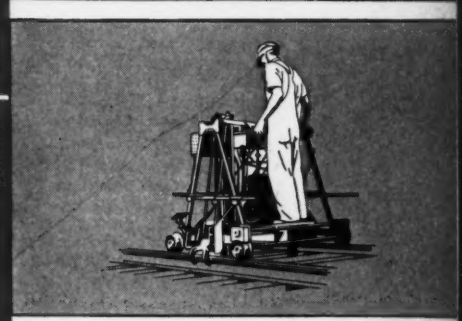

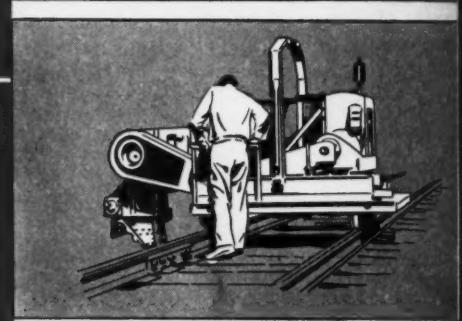

For more than twenty years, the name NORDBERG has been synonymous for outstanding development in machinery used for track maintenance. During these many years, Nordberg developed equipment that revolutionized maintenance methods and which today has become standard equipment wherever track work is done. The experience that has led to these developments is continuing to work toward new and better machines that will still improve the quality of track work, do the job faster and at less expense.

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No. 231 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Selling the Railroads

March 1, 1948

Dear Readers:

How important is it that those of you of supervisory rank in the field be "sold" the machines, power tools, materials and devices that are offered to help you in the wide variety of maintenance work carried out under your direction?

Recently I was surprised to hear a railway supply officer, speaking specifically about the forthcoming exhibit of the National Railway Appliances Association, say that his primary interest in exhibiting his products was to reach higher engineering and maintenance officers, and that, except for a relatively few key field officers of supervisory rank, it made little difference to him whether men of this rank were present.

This viewpoint surprised me because it is inconsistent with what I have always understood to be the attitude of most of the exhibitors, and the association officially. Accordingly, I was interested, only a few days later, to hear another exhibitor express exactly the opposite viewpoint. "To me," he said, "it is vitally important to reach the supervisory officer in the field. Surely I must contact and sell higher maintenance officers," he continued, "but it has been these very officers who have taught me that I must also sell the men in the field."

On at least two occasions, he said that he had been told by chief maintenance officers that he was wasting his time trying to sell them until he had first sold the field forces. The reason in each case was the same—that, regardless of the merits of a device or piece of equipment, experience had proved to these officers that it would be neither used nor maintained properly or economically unless those in the field were sold on its advantages—and enough so to ask for it. "That's why I advertise consistently in Railway Engineering and Maintenance," he said. "I want to reach the hundreds of field supervisory officers scattered all over the country, and in the most effective and economical way."

Does Railway Engineering and Maintenance reach these field officers, and do they see the "exhibits" in its advertising pages from month to month? Each of you in this group who reads this letter can best answer these questions for himself, but one convincing answer for your group as a whole should be that, of the hundreds of inquiries that we receive for additional information on what appears in Maintenance, more than 80 per cent are keyed directly to the advertising pages.

Of course, Maintenance reaches the higher officers too—on practically every railroad in the country—but no doubt it renders its greatest service to its vastly larger number of readers among the supervisory officers in the field, and thus serves best these officers and those supply companies that "must" reach these officers with their message.

Our answer to the question raised at the outset of this letter—at least for most manufacturers—is that they must "sell" the men in the field, whether through exhibits, direct contacts, the pages of Railway Engineering and Maintenance, or otherwise, and, furthermore, that it is important to keep them "sold." Are we not correct?

Sincerely,

Neal D. Howard
Editor

NDH:ag

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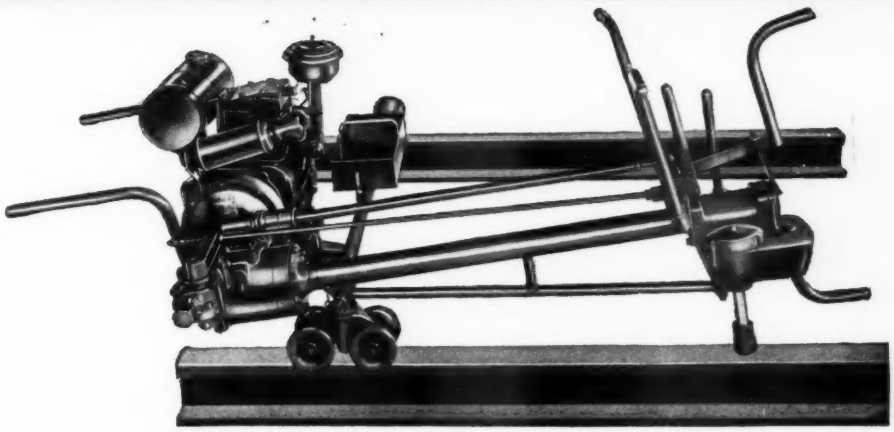
Raco Power Track Wrench



The new Raco Power Track Wrench can be quickly converted from nut running to screw spiking.

The Screw Spike Head makes the Raco supreme for running down, tightening or removing screw spikes or lag screws.

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

MARCH, 1948

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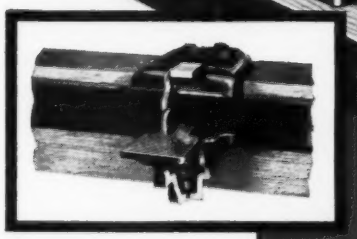
FIG. 3911 (Patented)

TWO STYLES AVAILABLE

Fig. 3911, for use with all types of column throw stands. Note how lockrod is securely engaged in lock treadle. Hand lever may also be padlocked if desired. Fig. 3912, for use with all types of ground throw switches. On this type of lock, one padlock provides positive locking of both lockrod and hand lever.



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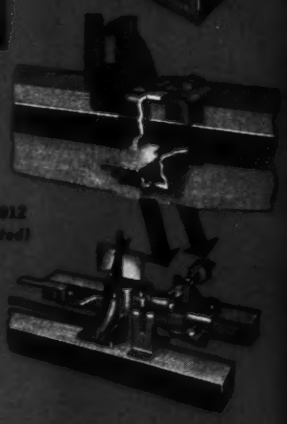

FIG. 3912 (Patented)

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Railway Engineering and Maintenance

Machines—

Essential to Railroad Operations and of Benefit to All

Again, as the heavy working season of the maintenance of way and structures forces is about to begin, this, another March issue of *Railway Engineering and Maintenance*, focuses attention on machines designed for maintenance operations—to lower unit costs, increase the amount of productive work that can be done, raise standards of production, and generally improve the lot of employees, individually and collectively, through less physical effort, and increased personal safety.

It is no new thought that we are living in a Machine Age. That age arrived in the United States and Canada, and in some other parts of the world, many years ago—received a big spurt following World War I, and another big push during and since World War II. From it there is no turning back. When the people demand so much in the way of high wages, better working conditions, shorter hours and improved products and services at lower costs, the only answer is to be found in the machine—more machines.

To as great an extent as in any other industry, and possibly more so, the railways are enmeshed in the march of machine power. Confronted with regulation on every hand, high taxes and mounting operating costs, while their competitors enjoy little or no regulation, and in some cases large subsidies at public expense, it has been necessary for the railways to adopt every technological improvement possible to cut unnecessary costs—and that need is increasing. To a large extent it is a matter of their survival—and equally so for their employees. Furthermore, only through the increased efficiency and productivity made possible by machines can employees expect continued high wages and constantly improved working conditions.

As has been pointed out many times by this publication, the opportunities for increased efficiency and lower unit costs in maintenance of way and structures work, through the more extensive and intensive use of power tools and machines, are manifold; the need for further mechanization of many types of work—especially on some roads—is great; and the benefits to employees in reduced manual effort, increased safety, and higher rates of pay, are many.

No one knows these facts better than those who plan and supervise maintenance operations, and especially those who come in contact with the rank and file of maintenance of way and structures employees in the field. They know that, without machines, the cost of many of their operations today would be prohibitive; that essential work would necessarily go uncompleted; and that quality would be inferior; and that labor, if it could be secured at all, would be required to work under serious handicaps and disadvantages. Accordingly, it is to the supervisory officer in the field that falls the larger responsibility to see that his forces are adequately mechanized; that they appreciate the advantages of the machines and appliances that are made available to them and that the most is secured from this equipment to the advantage of his company and those working under him.

To a greater extent than he may realize, his departmental superiors, and even management, look to him for advice and recommendations as to what and how much equipment to purchase. In fact, some chief maintenance officers refuse to purchase other than a few experimental machines in various categories unless there is enthusiastic recommendation of these machines on the part of those in the field, knowing that they will not be used efficiently or cared for properly unless accepted by the men willingly.

With this in mind, it is the responsibility of supervisory officers in the field to see that their men realize the problems of management and the

advantages of machines in the solution of these problems—not alone from the standpoint of their respective railroads as a whole, but in their own interest. Only in this way can they hope for the enthusiastic endorsement of machines by their men and expect to get the most out of these machines. Furthermore, only in this way can they hope to secure through management the machines which they know will prove advantageous to all concerned.

And at the same time, supervisory officers, who know so well the importance of machine methods to the welfare of their roads, their departments, and their men, as well as to themselves, should resist to the full the ill-advised and often unfair efforts from both within their own departments and outside to perpetuate or promote working rules or agreements that add nothing to the efficiency or safety of equipment, or operations, while saddling the railroads with unnecessary expense.

As stated at the outset, from the Machine Age in industry and on the railroads there is no turning back. The primary question in this matter insofar as the railroads are concerned is whether, with the aid of machines and their employees, they will be able to keep pace with and outstrip their competitors, or whether, lacking the aid of machines, or the most efficient use of them by their employees, both they and their employees will fall behind and suffer the inevitable consequences.

A Lesson—

In the Contractor's Use of Machines

IN discussing a particular aspect of the problem of mechanizing maintenance work, a railroad supervisory officer recently drew an interesting comparison between the progress made by the railroads on one hand and contractors on the other. His opinion is that the average railroad man "will get more new ideas as to equipment usage from observation of contractors and other outside construction people than from salesmen". He then put the matter on the basis that "seeing is believing", pointing out that if a contractor will use certain equipment to make money, why not use it in comparable railroad work to save money and conserve labor?

It is an unquestioned fact that a successful contractor will seldom do anything with hand labor that can be done with machine power. Whether engaged in grading, in constructing a bridge or building, or when doing track work, he seldom misses an opportunity to mechanize the effort involved. And if the work entails operations for which no machines are available he is very apt to turn inventor long enough to devise equipment that will do the job.

Why is the average contractor so eager to use machines? The answer is simple. In the first place he must be able to quote a figure when bidding that will be low enough to land the contract, and he knows that without the highest possible degree of mechanization he is lost. Secondly, having won the contract, he knows that every dollar saved in the use of labor is a dollar for his own pocket.

Whether contractors have been more progressive in the use of machines than railroad maintenance men is a moot question; there can hardly be any yardstick that will yield a definite answer. However, since the opinions quoted at the outset of this editorial are those of a railroad man, it can be assumed that there is a certain amount of truth in them. If so, the reason probably lies in the fact that contractors as a whole feel motivated by a greater personal incentive, i.e., the intensive use of equipment means more profit from the particular job.

Superficially it may appear that railroad men do not have this same incentive. Nothing could be further from the truth. To a large extent, on the maintenance man's ability to adopt power equipment to aid him in his work depends his job, his future and that of the industry for which he works. Urged on by the realization of the truth of this statement, the average supervisory officer is likely to have a clearer, sharper view of the advantages of mechanization.

Small Tools—

Just as Important as Large Machines

IT IS easy to acquire the habit of thinking of mechanization in terms of the larger machines. Any such tendency, however, should be carefully avoided, for it would be a serious mistake to overlook the possibilities inherent in the smaller power tools and machines.

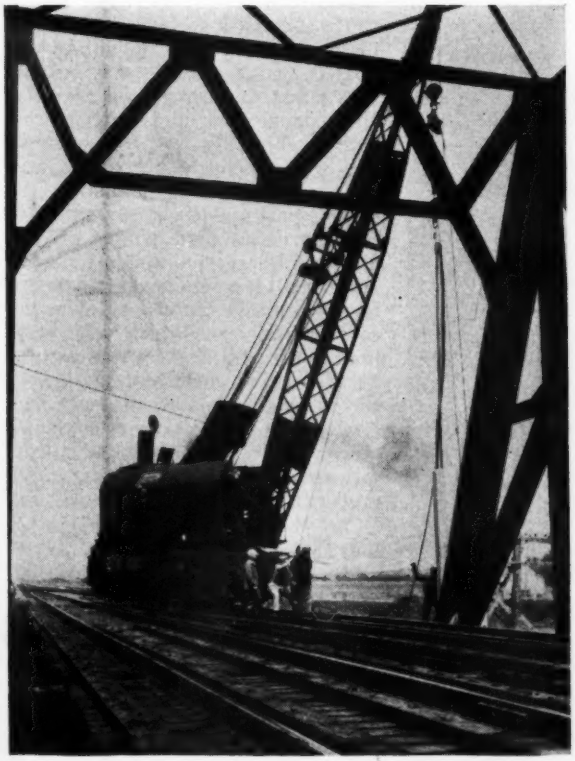
As used in this sense a small power tool is any unit that may be operated and readily handled by one man. Such tools may be driven by air, electricity or mechanical means, with the power furnished from a portable plant, a fixed air or electric line, or a self-contained unit mounted on the tool itself. The list of jobs that may be performed with them is a long one—sawing, boring, drilling, wrenching, grinding, scraping, wire-brushing, reaming, riveting, concrete breaking, flame-cleaning, welding and cutting, spray painting, sand blasting, and lifting—these are a few of the operations that come readily to mind. All of them, and many others, are commonplace in railroad maintenance, especially where it involves bridges or buildings, and the rewards are rich indeed when machine-power can be applied to them.

For a long time the application of power tools to these various tasks was slowed by the lack of power plants of ready portability. Because of developments of recent years, which are continuing, this situation no longer obtains. Portable units supplying electric power, compressed air or mechanical action have been perfected to the point where they may be readily lifted and moved by one or two men. Thus the wherewithal for operating power tools may be made available practically everywhere.

It is hardly necessary any longer to talk of the savings to be expected through the use of small power tools, except by way of emphasizing a fact that is already accepted by every alert maintenance man. If anything, the returns from the use of such tools, per pound of weight or dollar of investment, are greater than for their larger counterparts. It merely remains to recognize the possibilities presented by these tools, to visualize where they may be applied in various types of railroad maintenance work, and then to leave no stone unturned in converting the possibilities into realities.

Many Units of Large Earth-Moving Equipment Will Be Required for Line Changes and Other Heavy Grading Work During the Next Year

Work Equipment Purchases To Continue at High Level



About 6,500 Units of Heavy Equipment Will Be Purchased by the Railroads During 1948

Sparked by need, high labor costs and income from a large volume of traffic, railways may purchase more than 9,500 machines and tools in 1948 at a cost in excess of $19,000,000

WERE it not for the economies and other benefits that can be realized by mechanization, railway officers would now be hard pressed to continue desirable standards of maintenance in the face of the relatively low quality of available transient labor and the high wage rates they have to pay for it. Thankful that these economies are possible, these officers are not only planning to continue a high level of purchases of work equipment during 1948, but are expecting to use all of their equipment to the fullest extent possible in order to lay more rail and surface more track than they did last year.

These conclusions are reached from an analysis of the replies received from a number of officers of a select group of roads who were questioned as to what types and what numbers of power machines and tools they expect to buy this year, and why they were buying them. Replies were received from 33 roads, of which 28, representing more than 100,000 mi. of lines, said they expect to purchase various amounts of equipment in 1948. The remaining five indicated that to the present time they have not prepared definite budgets for machinery.

An officer of one of the 28 roads mentioned said, "we are continuing to purchase roadway machines to carry out our large program to provide a better railroad. While we are now equipped with a large number of roadway tools, we find it necessary to acquire additional units yearly to replace worn out machines and to equip ourselves with newly-developed labor-saving machinery." He did not indicate, however, what specific machines are to be bought. A second said that his purchasing department was obtaining prices on a variety of machines, both large and small; and a third classified the various types of machines which would be purchased, but gave no data as to how many of each would be bought. Eleven of the remaining roads gave specific information on anticipated purchases of more than 100 units each. Three of these have plans to buy more than 200 units apiece; and all 28 roads plan to purchase a total of 2,407 units.

High Level of Purchases

On the basis of the actual number of units included in the budgets of prospective purchases, it is estimated that the railways of the United States and Canada are planning to purchase approximately 6500 units of the heavier types of equipment in 1948. This figure does not include any of the small, portable, power-operated hand tools becoming so increasingly important to the work of the bridge and building forces, since this type of tool seldom appears in the budgets for work equipment, even though it is purchased in considerable quantity every year. Neither do these budgets include many of the portable tools which are used by the track forces. Hence, they too must be considered apart from this figure.

Small Tools

Since the popularity of these smaller tools has been proved by their purchase in recent years in ever-increasing numbers, it is estimated that no less than 1,800 of such units will be bought during 1948. When these are added to the figure previously mentioned, the total number of units which the railways are now planning to purchase is increased to about 8,300. Experience has shown, however, that the budgets are always lower than actual subsequent purchases. Records of such comparisons indicate that purchases can be expected to exceed the budgets by 10 to 40 per cent. Taking this into consideration, it may actually develop that purchases during 1948 will exceed 9,500 units, for which more than $19,000,000 will be spent.

In order to be informed not only of the expanding use of work equipment by the maintenance of way and structures forces of the railroads, but also of any trends formed by the changes in types of equipment and methods being employed, an analysis has been made of the specific information given by the various roads, reporting on their work equipment budgets for the year. This analysis shows, at the outset, that these budgets include 93 types of equipment. This is a larger variety of machines and tools than has been budgeted in any other year. Even this number does not include the previously mentioned small tools, except power saws, wood borers, and power wrenches used by the bridge, building and track forces. Hence, it is evident that the actual purchases will include a much larger number of types. The complete list covers machines for a great variety of maintenance operations from fighting snow to extinguishing fires, and a wide range of tools and equipment from radar sounders to portable pipe-threading machines, from concrete mixers to demolition tools, and from rail detector cars to push cars. In fact, while this sketchy outline names only a few of the 93 types that were mentioned specifically, the complete list includes machines and tools for practically every maintenance task for which mechanized equipment is available.

Demand for Vehicles High

Estimates of the number of each class of equipment that will be purchased by the railways this year indicate that the demand for means of transporting men and materials will continue high. In fact, equipment for this purpose, including motor cars, push cars, trailers, automobiles, station wagons, and trucks account for 48 per cent of the total number of units about which specific information was furnished. It is significant to note that the prospective purchases of motor cars and push cars, which have always been the backbone of transportation for the maintenance forces, will continue at approximately the same high level of previous years, even though other types of equipment for moving men and materials are being bought in ever-increasing numbers.

Rail Laying to Increase

Pointing out recently that the deferred maintenance in roadway accounts of the Class I railroads, which accumulated from 1942 to 1946, inclusive, totalled $450,000,000, the Engineering section of the Bureau of Valuation, Interstate Commerce Commission estimated that the amount of rail deferred represents about 2½

For the 1948 Programs, Approximately 580 Rail-Laying Units Will Be Purchased

years of normal installations when traffic volume is heavy. Inadequate supplies of rail in 1947 added to this total on some roads. That the railways plan to do all they can to overcome this deficiency is evidenced by the fact that the majority of them expect to lay more rail in 1948 than they did last year, if it is available. To accomplish this, it is estimated that they will purchase a total of 580 units of rail-laying equipment. This continues their policy of the past several years of buying large amounts of such equipment, including tie adzers, bolt tighteners, rail cranes, spike drivers, spike pullers, rail and bonding drills, rail saws, and machines to lower the ballast in the tie cribs ahead of adzing operations.

When large tonnages of new rail are laid, it is to be expected that a commensurate amount of out-of-face surfacing will be done, and such is indicated for 1948. In fact, current equipment budgets provide for a total of about 700 additional and replacement units of various types to handle this work effectively. These include cribbing machines, power jacks, pneumatic and electric tampers, unit tampers, and large on-track tamping machines. This figure does not include those units not specifically identified as to be used exclusively for surfacing track, such as air compressors, either crawler, track or wheel-tractor mounted, of which a large number are included in the 1948 budgets.

Earth-Moving Equipment

While drainage, with its vital importance to the maintenance of railway tracks, has always been considered the prime reason for the purchase by the railroads of increasing amounts of earth-moving equipment, other factors have arisen to increase the demand for such equipment. First in importance among these is the increased capacity and efficiency which has been built into much of this equipment, which has made it possible for the railroads to undertake, with their own forces, many line and grade change projects to improve operating efficiency and lower maintenance costs. Intelligent use of this equipment in connection with bridge, trestle and culvert work is being reflected also in lower costs.

That the railroads are not ignoring such opportunities to improve operating conditions and decrease maintenance costs, even where extensive grading operations are required, is indicated by the fact that their budgets call for the purchase of more than 365 units of the larger types of earth-moving equipment, many of which are duplex in nature, to provide for loading, scraping and hauling. Not included as earth movers, although definitely used in that connection, as well as for other purposes, are the many dump trucks being bought by the railroads.

Additional Units of Equipment for Re-Ballasting Will Be in Demand in 1948

Closely allied to drainage improvements, weed control or eradication is becoming more and more a focal point in the track maintenance picture. While railway officers have always looked with disfavor on the hand scuffing of weeds, the present high cost of labor has made this practice totally impractical. Therefore, it is not surprising that the purchases of weed destroyers by the railways are continuing at the highest level in history. Machines in this category include weed burners of many kinds, extinguisher cars, and mowers of all descriptions, both on-track and tractor-mounted. It is to be expected that more than 200 of these machines will be bought this year. This estimate does not consider the indefinitely described units among the purchases to be made, such as tractors and their accessories, torches, sprayers, etc., all of which may have many uses, including weed destruction.

It is axiomatic that power plants are of little use in themselves. Therefore, from the large interest evinced by the railways in these units, it can be assumed that the probable purchases of small tools to be powered by generators and air compressors will be higher than usual. The advantages that can be ascribed to the use of such power tools, especially in bridge and building work, are numerous. Not the least of them is the intangible improvement in morale that can be claimed where power tools are used, which, in many instances, has held men on the railways who would otherwise have drifted to other work. These influences, combined, point to a 1948 demand for this type of equipment that may total 1,800 units.

Among the remainder of the 93 types of equipment in which more than normal interest is shown in the budgets are such machines as concrete mixers, derrick cars, grouting machines, rail and flange lubricators, paint sprayers, snow plows, snow melters, and steam cleaners.

Reflected to a certain extent in many of the budgets is an evident undercurrent of expectancy, predicted on the knowledge of new products and devices under development or test, but not yet available for purchase. Under such circumstances, most maintenance officers will not commit their budget authorities "to the hilt," but rather will sit tight, await developments, and be prepared to take advantage of the first offering of any new equipment that fills their needs and has demonstrated its merit.

In summary—all tangible indications are that purchases of work equipment in 1948 will continue at a high level. There can be no turning back. The many proven advantages of machine methods in producing a higher standard of track and structure maintenance, lower unit costs, and improved working conditions, while at the same time attracting more competent men and reducing turnover, are assurance that increased mechanization will continue. At the same time, in the face of such strong factors tending to create a large demand for further mechanization, and the high volume of traffic on the railways to produce the purchasing dollars, it is inconceivable that work equipment purchases in 1948 could do anything other than continue high—in fact, at any but the highest level consistent with the supply, quality and adaptability of the products offered to the railroads.

New Machines A

Left—One of the Cribex Machines at Work on the Santa Fe. Below—View of the Skeletonized Track Showing One of the Old Ties To Be Removed

Two recently-developed track machines—the Nordberg Cribex and the Jackson Multiple Tamper—are being used effectively by the Santa Fe in its track-resurfacing projects. Six of the Cribex machines have been leased by the road for use in removing old ballast from the tie cribs in advance of the distribution of the new ballast. This work is followed by the track-raising operation in which the Multiple Tamper—a single machine involving 12 vibratory tampers—is used to consolidate the ballast firmly and uniformly under the ties. The organization and scope of the work, together with descriptions of the machines, are included in this article.

MAKING effective use of two recently-developed power track machines—the Nordberg Cribex and the Jackson Multiple Tamper—the Atchison, Topeka & Santa Fe, last year reballasted and raised several stretches of track on its Illinois division, aggregating eight miles. During this work, all of which was done in gravel-ballasted territory, the daily production of the machines was high. The Cribex machines, six of which were in use, frequently cleaned in excess of 120 half-cribs per hour per machine—the average for October being 97.5 half-cribs per hour—while the Multiple Tamper averaged 2,600 ft. of track tamped per eight-hour day and on several occasions exceeded 2,800 ft. in such a period.

The Santa Fe's Illinois division extends from Chicago to Fort Madison, Iowa, 233 mi. This line is double track throughout and is laid with 112-lb. rail or heavier, on 24 ties per 39-ft. rail. The tracks are ballasted with gravel of the type known as G-1. The particles of material in this grade of ballast vary up to 1½ in. in size, and the sand content is somewhat higher than that to be found in other grades of prepared gravel ballast.

The practice on the Santa Fe in working this type of track structure is to resurface whenever the old ballast becomes foul to the point where it loses the qualities of elasticity, resiliency and quick drainage. Usually, this work becomes necessary at intervals of approximately 10 years, depending on the volume of traffice and other local conditions. The reballasting is accomplished by stripping the old ballast from between the ties and at the ends of the ties, after which the track is raised an average of three inches on a layer of new ballast. Tie renewals and tie-respacing operations are usually carried out in conjunction with the track-raising phase of the resurfacing program.

The Cribex Machine

The Nordberg Cribex and the Jackson Multiple Tamper lend themselves to projects of this type. The Cribex, which was described in detail in the January, 1947, issue of *Railway Engineering and Maintenance,* removes the ballast from the cribs and deposits it beyond the ends of the ties. Mounted on a four-wheel truck for movement along the track, the frame of this machine supports a carriage which is arranged to move laterally. The carriage supports the power unit and the excavating mechanism, the latter consisting of a pivoted digging boom with an endless chain containing a series of digger flights. The unit is powered by a gasoline engine which operates the endless chain mechanically and also drives hydraulic pumps for controlling the movements of the boom and the transverse carriage. It can be adjusted to excavate as much as 13 in. below the base of rail.

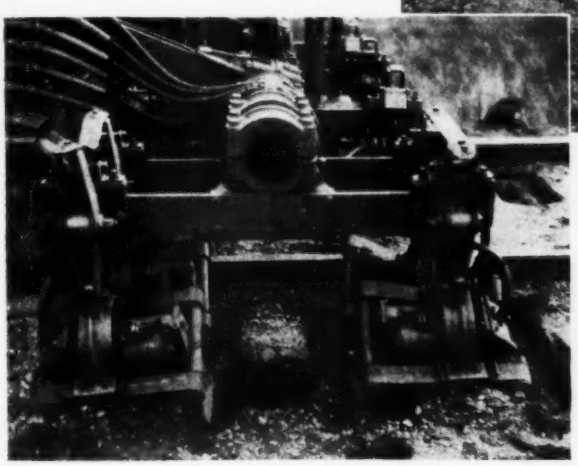
In operation, the free end of the pivoted digging boom is lowered gradually and enters the crib at the ends of the ties. The digger flights in the endless chain loosen the ballast and carry it beyond the ends of the ties. When the boom is fully lowered, the end will have passed under the rail to penetrate the crib to a point inside the rail. The transverse carriage is then placed in motion to carry the end of the boom to the center of the track, thus completing the excavation of half of the crib. The carriage is then reversed and the boom is raised to clear the ties for movement to the next crib. On the Santa Fe's ballast-stripping work, the cycle for stripping a

Are Big Help in Santa Fe's Out-of-Face Resurfacing Program

half-crib and moving forward to the next one averaged approximately 36 sec. The Cribex is manned by two men—an operator and a helper. The movement of the machine from crib to crib is accomplished by the operator and his assistant, who move and spot it manually.

The Cribex units are leased from the Nordberg Manufacturing Company on the basis of the number of cribs stripped in a stated period.

The Multiple Tamper, which was described in *Railway Engineering and Maintenance* for June, 1947, is an on-track unit equipped with 12 electric vibratory tampers arranged



Above—The Multiple Tamper Shown with the Tampers in the Lowered Position. Left—Showing How the Tamping Blades Penetrate the Ballast

to tamp both sides of a tie simultaneously, the tamping being done outside, as well as inside, the rails.

The individual tamping units are attached to a heavy transverse crosshead which is mounted in advance of the front end of a four-wheel truck by means of a cantilever arm arranged so as to move vertically. The individual tampers are mounted in opposed pairs, with two pairs outside and one pair inside of each rail. The tamping blades in each pair are inclined so as to penetrate toward each other when under the tie. The tampers are also cocked toward the rails so that, as the blades penetrate into the ballast, those nearest the rails will tamp under them. In operation, the crosshead, with its attached tampers, is raised and lowered hydraulically, controlled by a single valve, while the machine is moved from tie to tie by the operator with the aid of a handwheel drive.

To tamp a tie, the crosshead is lowered to permit the tamping blades to enter the ballast. As soon as the tampers reach the limit of penetration under the ties, the crosshead is raised and again lowered immediately. This cycle is usually repeated three, and sometimes four, times in tamping a tie properly. The machine is then moved ahead to the next tie. The time required to make three insertions of the tamping guns and move the unit to the next tie averaged six seconds on the Santa Fe project. Thus, the machine tamped an average of 10 ties per minute, or 600 per hour, when operating continuously. However, delays occasioned by traffic, or caused by the machine's catching up with the track-raising work ahead, prevented this production rate from being maintained throughout the day.

Ballast Plow

Another machine used in connection with the resurfacing work described in this article was a special car-mounted device for excavating old ballast from the inter-track space in advance of the cribbing work. This machine, which was developed by the Santa Fe, is known as an Inter-Track Ballast Plow and is mounted on a special car of the well type, which, when in operation, is incorporated in a work train. It consists essentially of a large metal ballast scoop, supported by a boom, which elevates the ballast to a transverse conveyor belt, which, in turn, carries the ballast across the track and deposits it on the roadbed shoulder. The boom, and thus the scoop, is raised and lowered by means of an air-driven winch operated by a stationary compressor on the car. The compressor also supplies air for driving another air motor which operates the transverse conveyor belt, located

in the well below the level of the car floor.

When this machine is to be used, the work train is made up so that the boom and scoop will be on the inter-track side of the train when the site of the work is reached. In operation, the boom is lowered so that the scoop, of which the rear end is curved upward, is in contact with the ground. The train is then placed in motion at a speed of about 2 m.p.h. and the scoop digs into the ballast by its own weight until it reaches a maximum penetration of about 18 in. below the tops of the ties. The old ballast thus confined in the scoop is forced to the rear and upward, ultimately falling from the scoop onto the endless belt which carries it across the car to deposit it on the roadbed shoulder. This plow leaves a trough in the inter-track space, which is trapezoidal in shape, about 30 in. wide at the top and 18 in. wide at the base.

The first step in the preparation of the track for resurfacing was the operation of the Inter-Track Ballast Plow along the inter-track side of each stretch of track scheduled for resurfacing. This was followed by the Cribex machines, which were operated so as to strip one side of the track on one day, and then, by turning the machines on their portable set-offs, to strip the other half the following day. When the Cribex units were at work on the inside half-cribs, the excavated material was deposited in the trough left by the ballast plow and was later leveled off by hand. However, when working on the outside half of the track, the material was deposited on the roadbed shoulder and was leveled by a Jordan spreader operated in the work train from which new ballast was unloaded on the skeletonized track.

At locations where stretches of track remained stripped on one side over night, trains were operated over the skeletonized section at scheduled speeds. However, a slow order of 30 m.p.h. was placed in effect on fully-skeletonized track until new ballast was distributed. Normally, to avoid the use of slow orders, new ballast was distributed over fully-skeletonized track before the close of the day.

The work of raising and tamping the resurfaced track was carried out immediately after the distribution of new ballast. This work was done to grade stakes, which were set by engineers from the division offices at Chillicothe, Ill., and were determined from profiles run over the track prior to the resurfacing. The average raise was 3 in.

The Illinois division of the Santa Fe received four of the Cribex machines on July 1 and two additional units on August 6. The first group was placed in service on the westward track near Laura, Ill., 153 mi. from Chicago, working between Mile Post 153.5 and Mile Post 166.5. On the completion of this work, the machines were transferred to LaRose, Ill., approximately 40 mi. farther east, where they were used for approximately three weeks, during which period the additional machines were received. Later all six units were returned to the first location to work a 5-mi. stretch on the eastward track, this being between Mile Posts 161 and 166.5. This project completed the work programmed for the Illinois division during 1946.

Left — Another View of a Cribex at Work. Notice the Trench in the Foreground Left by the Ballast Plow

Below—The Cribex Units Were Dispersed Along the Track at Intervals of Two Rail Lengths Each

Machines Dispersed

At the start of a day's work, the Cribex machines were dispersed along the track at intervals of two rail lengths. All of the machines then began work simultaneously. When all of them had completed stripping their respective double-rail-length sections they were moved ahead twelve rails and the cycle was repeated. It was felt that the "breaks" afforded in making the relatively-frequent moves made the work less tedious and, in consequence, actually increased production.

Each Cribex is equipped with a special set-off for use in removing it from the track, which can be done in less than two minutes. However, on the Santa Fe, maximum use of the track was afforded the equipment, and trains were detoured around the units whenever possible. This practice, of course, could not be followed at all times and it was necessary in some instances to work the units under train order and flag protection. The set-off equipment was for turning the machines as well as for setting them off the track.

A force of one foreman, one assistant foreman and 28 laborers was employed with the six Cribex units, in addition to the operators and their helpers. The laborers followed the machines, digging out the old ballast

adjacent to the ends of the ties and hand cribbing at locations where the machines were incapable of working, such as at turnouts and where slued ties prevented the entry of the digging boom.

The Multiple Tamper was placed in service on September 17, working on part of one of the projects already mentioned—the westward track between Mile Posts 160 and 166. Prior to this date all track-raising work in connection with the resurfacing projects had been done with track gangs equipped with eight-tool electric vibratory tamping outfits. On the completion of the work on the westward track, the machine was shifted to the eastward track, to work between Mile Posts 164.75 and 166.5. Open order offices at Mile Posts 158.3 and 165.9, respectively, together with crossovers at each of these stations, permitted the operation of traffic around the Multiple Tamper on each track, except for a short distance at the west end of the project. Here, it was necessary for the unit to work under flag protection and trains were given a positive work order directing them not to pass a given point without a hand signal.

Above — The Multiple Tamper Worked Close Behind the Track-Raising Gang

Right — Making a Run-Off with an Eight-Tool Electric Vibratory Tamping Outfit

The Organization

Two 40-man extra gangs were combined to work with the Multiple Tamper. These gangs were composed largely of transient labor, with the usual percentage of absenteeism and turnover of personnel, so that it was difficult for the organization to function as effectively as might be desired.

The force was organized under a general foreman, two foremen and two assistant foremen. The laborers were organized as follows: 2 men removing rail anchors; 8 men, equipped with four jacks, raising the track to grade and shovel tamping the ends of the ties; 16 men, using four Simplex tie spacers, spacing ties; 14 men putting in new ties; 10 men spiking; 20 men throwing in additional ballast from the inter-track space and the shoulder to fill the cribs; 3 men, equipped with one jack, following behind to "pick up" low spots in the track surface; 1 operator and 1 helper on the Multiple Tamper; 2 men installing rail anchors; 2 flagmen; and 1 water boy.

As already indicated, the track raising was done to grade stakes, a spot board being used to establish an even grade between the grade stakes. A spot board was also used by the three-man gang which smoothed out the irregularities in surface that developed behind the tie-renewal and spacing operations.

The Multiple Tamper is always operated with its tamping assembly in advance, so that the car is always standing on tamped track, a feature that is said to insure uniformity in tamping. In general, only three insertions of the tampers were required on the Santa Fe although it was occasionally necessary to make a fourth or fifth insertion. The need for additional insertions was determined by the operator, who soon became accustomed to the "feel" of the machine when a tie was properly tamped.

As stated previously, the average production for the Multiple Tamper was 2,600 ft. of track per day, with the performance for the best day being 2,850 ft. The fact that this output was somewhat less than was considered potentially possible was occasioned primarily by the labor conditions already referred to, which prevented the various operations that were done by hand labor from progressing as rapidly as desired. Consequently, the machine frequently caught up with the raising work, so that its production was correspondingly slowed.

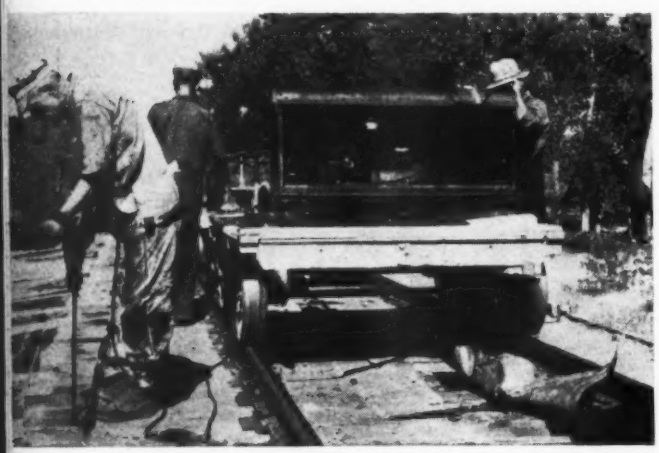
Following the track raising and tamping, a light distribution of ballast was made by work train to fill the cribs and to provide sufficient ballast for dressing the track to the required section. This work was done by the regular section forces in each territory.

On completion of the projects on the Illinois division, and with the approach of the winter season, the Cribex machines and the Multiple Tamper were transferred to the Santa Fe's Coast Lines in California where they have been working throughout the winter in rock ballast.

The ballast stripping and resurfacing operations described in this article were carried out under the general direction of T. A. Blair, assistant chief engineer system, of the Santa Fe, Chicago. C. L. Huggins, roadmaster, Chillicothe, Ill., and C. A. Huggins, supervisor, Galesburg, Ill., were in direct charge of the work.

More Power Tools!—The Cry of

Adaptable to a Wide Range of Operations in Bridge and Building Work Is This 30-Cu. Ft. Ingersoll-Rand Portable Compressor. It Will Operate Riveting Hammers, Chipping Tools, Wrenches, Etc.



Above—On a Tie-Renewal Project Drilling Ties With Power Supplied by an Onan Electric Plant. Below—Drilling Bridge Timbers With Air Furnished by a Worthington-Ransome Compressor

In Emergencies Too, Homelite High-cycle Portable Generator Furnishing Power for Various Saws and Other Portable Power Tools. Generator Also Serves as Source of Power for the Floodlights

In recent years rapid progress has been made in putting power tools and equipment into the hands of the bridge and building forces. Tools of the smaller types have been in particular evidence in this trend. To determine the value of such tools to the bridge and building forces, the nature of specific savings that have been effected, the extent to which there is still an unfilled need for them, and other questions, a number of bridge and building officers were asked to participate in a "round-table" discussion of the subject. The results are summarized in this article.

WHAT is the value of power equipment, especially power tools of the smaller types, to the bridge and building forces of the railways? Are these forces adequately supplied with such equipment, or is there a need for more tools and machines and, if so, what types? Is there a need among these forces for additional types of tools that have not as yet been developed or perfected? Finally, to what extent has the need for further mechanization of the bridge and building forces been influenced by the upward trend of wages?

A Specialized Problem

The provision of power tools and equipment for the bridge and building forces is a highly-specialized phase of the overall problem of mechanizing the maintenance forces of the railways. This specialized nature of the problem is due in part to the amazing variety of available power tools and equipment that is adaptable to the work of the bridge and building forces. Encompassing as it does every conceivable operation involved in constructing and repairing many different types of steel, wood and masonry structures, such work, in turn, demands many different types of power tools if advantage is to be taken of the opportunities for savings offered by mechanization. In spite of the availability of power tools and the need for them there is reason to believe that the mechanization of the bridge and

# of B. & B. Forces

building forces has lagged behind that of other branches of maintenance work, and that, consequently, many opportunities for doing bridge and building work more economically, effectively and safely are still being overlooked on some roads today.

This line of reasoning leads naturally to the questions that have been propounded in the first paragraph of this article. Obviously, the situation varies widely among different railroads and for this reason it is impossible to answer the questions categorically. Rather, it would seem that the best way to approach the subject would be to obtain a representative cross section of opinions and experience from men on the "firing line" and to present it in such a way as to stimulate further thought.

A "Round-Table" Discussion

Putting this idea into action a number of supervisory officers were asked to participate in a discussion of the subject, especially from the viewpoint of the questions stated at the outset of this article. As a result, expressions of opinion and experience were obtained from nine officers on eight different railroads scattered throughout the country. To encourage these men to speak their minds freely, it was stipulated that their answers would be presented only in summary form and that no names would be mentioned.

As was to be expected there was no dissenting opinion among those participating in the discussion regarding the value of mechanizing the bridge and building forces. While the cost reductions that are possible through the use of power tools were always mentioned or implied as an important factor in determining the value of such equipment, various other advantages were given prominent mention, such as the use of power equipment as a factor in permitting the forces to do jobs quickly, thereby avoiding or reducing slow orders. The favorable effect of mechanization on the men themselves was also mentioned as an important consideration.

The consensus regarding the value of mechanization may be summarized in a succinct manner in the words of one man as follows: "Mechanization of a gang will not only increase the efficiency with which the work is done but will also make the men better satisfied with their work. The average American working man enjoys a feeling of accomplishment at the end of a day of labor. We have definitely found that there is less labor turnover in a mechanized gang as against a 'bull' gang in which all of the work is accomplished by the sweat of the brow and the strength of the back".

Are Morale Builders

Another man chimed in with the thought that "small power tools may be considered morale builders for the men. It is a known fact that after a gang has been equipped with power tools, the men take a greater pride in their work and strive to do it in the most effi-

Removing Rust and Scale from Cross Member of a Railroad Bridge With a Chicago Pneumatic Scaler Which Has a Vibratory Action

Impact Wrenches Have a Wide Application in Railroad Bridge Work. Here is a Thor No. 20 Unit Applying Nuts on a Girder Job

Cutting Corrugated Asbestos With a Black & Decker Portable Saw Equipped with a Diamond Rim Blade and Wet Attachment

Portable Pumps Have Many Uses. This Is a Gorman-Rupp Self-Priming Centrifugal Pump Working on a Project at Seattle, Wash.

C-P Hammer Rivets an Angle Iron, Previously Bolted On By the Impact Wrench

Above—Doing Bolting-Up Work on a Girder With an Ingersoll-Rand Impact Wrench

cient manner, thereby effecting a considerable saving in the cost of labor."

Regarding the effect of higher labor costs on the value and need for mechanization, there was likewise no dissenting opinion. Discussing this phase of the subject, one of the participants said that "the higher the labor costs, the more need we have for mechanization, and the more money we are justified in spending for the equipment". Approaching the subject from another angle, one man estimated that, at present-day labor costs, a portable power plant properly equipped will pay for itself within 2½ years when used by a bridge and building gang doing ordinary repair work."

There were frequent expressions of opinion regarding the need for further mechanization, speaking both in a general sense and also with reference to particular types of tools. One officer, saying that the mechanization of bridge and building forces has lagged behind that of the maintenance of way forces as a whole, said that this situation "in many instances cannot be laid at the door of management" but that, rather, "supervisory forces have not kept abreast with developments in mechanical equipment adaptable to their everyday needs". He spoke of instances where, "through neglect of supervisors and foremen", equipment furnished by management has become worn out or ruined through abuse, lack of maintenance or general neglect. The same officer, while expressing the opinion that most structural steel gangs are well mechanized, said that "the converse is true of carpenter forces".

Speaking in this same vein another man expressed the thought that the railroads "have been somewhat behind the times in taking advantage of developments that contractors have been quick to adopt". "As a matter of fact", he said, "the average bridge and building man will get more new ideas as to equipment usage from observation of contractors and other outside construction people than from salesmen".

"Still Way Behind"

Referring specifically to the extent of mechanization on his road one of the participants said that "we are still way behind in compressors". "Out of six divisions", he said, "we only have two modern two-stage compressors for use by bridge and building gangs. The other gangs are using old four-tool compressors which are not adequate for operating a full set of steel tools". He also said that his company is "still far behind in supplying power tools to bridge and building gangs whose work is concerned with timber structures".

Estimating that a fully-mechanized eight-man gang would operate at a saving of approximately $12,000 a year, one officer said, that in view of this saving, it would seem "that railroad management would rush to purchase the needed equipment, even if the savings were only one-half of the amount I have estimated". In spite of such demonstrated economy, he said, "it is an uphill struggle to make suitable progress in obtaining more equipment".

What types of tools are now in particular demand for the bridge and building forces? Some of those participating in the discussion answered this question in a general way, stating simply that there was a need for more tools of all types. Others were more specific. One man,

Below—I-R Compressor Supplies Air for Cleaning Dirt from the Bridge Members

Below—Air for This Paint-Spray Operation Is Being Supplied by a Schramm Compressor

for instance, said there is a large demand for small power tools to fully mechanize bridge and building gangs engaged in timber-trestle and tunnel work, saying that, in a spot check of 55 gangs, he found only 16 of them adequately equipped. Another made specific mention of the need for mechanical cleaning equipment and paint-spraying machines for district gangs assigned to the painting of steel structures. Still another officer, expressing a particular preference for portable electric power plants equipped with various tools, said that more than half of the gangs on his road were now equipped with such outfits and that a program is under way to have every gang supplied with one of these units.

Nearly all of those participating in the discussion mentioned the need for new types of tools or equipment not yet available, or indicated the desirability of certain improvement in existing tools. One officer spoke of the need for a guide on chain saws to provide for more accurate timber-pile cut-offs. The same man also wants a 2-ft. longer boom on derrick cars, with more cable on the lifting drum. Another desires to have a portable power-operated adzer light enough for one man to handle, and tunity for a light air compressor between 30 and 60 cu. ft. in size.

The latter officer also wants a larger cup power brush (12 in. to 15 in. in diameter), saying that it would "fill a long-wanted need and result in large savings". Still another desires to have an electric impact wrench that will handle ¾-in. nuts, and also says that much electric equipment does not provide suitable ground connections.

Numerous specific examples were cited of savings effected through the use of power tools and work equipment in bridge and building work.

Cleaning a 100,000-Gal. Steel Water Tank With Airco Multi-Flame Cleaning Equipment

A representative of an eastern road, discussing the results obtained with the use of impact wrenches in connection with work involving the strengthening of steel bridges during the war, said that, through the use of such tools, the time required to change out cover plates was reduced by 75 to 80 per cent.

A representative of a western line said that experience on one division of his district had shown conclusively that power tools resulted in an average saving of 25 per cent in labor on timber-trestle jobs, and that the use of a pneumatic borer on wood-trestle work indicated that one man using this tool would drill as many holes as four men using hand augers.

The reconstruction of a burned-out trestle, 406 ft. long, was described by one of those participating in the discussion. Work on this trestle was done by three fully-mechanized bridge gangs, two of six men each and the other having seven men. Stating that this bridge was re-opened for traffic within 14 hr. after the material arrived at the site, the man describing the job said that, on a conservative basis, this was less than one-half the time that would have been required without the use of power tools.

Above—Syntron Gasoline Hammer With Tool for Loosening Clay and Shale. Below—Barco H-6B Hammer Driving Sheeting

Below—Making Emergency Bridge Repairs at Night With Stanley Electric Saw and Heavy-Duty Drill, Operated by a Portable Generator. Latter Is Also Operating the Floodlight

Railroad Contractor Cuts Costs with Modern M

On the basis of his experience in carrying out three contracts covering out-of-face rail laying, surfacing and retimbering, involving a total of 129 mi. of track, the author of this article first describes the evolution of his various gang organizations and their mechanization to reduce unit costs, and then discusses in detail how these organizations can be utilized generally by the railroads to rehabilitate track in cycles to effect still further economies. Included in the article are several tables of gang organizations, equipment used, and unit costs.

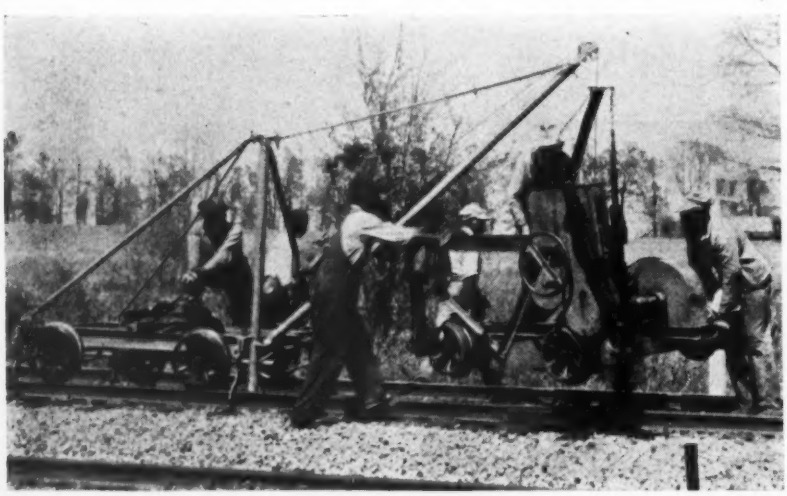
Two Men, Equipped with Kershaw Spike-Setter Carriages, Are Said To Be Capable of Setting Spikes for the Pneumatic Spike Drivers as Rapidly as Nine Men Can Without Them

By ROYCE KERSHAW

Consulting Engineer
Montgomery, Ala.

DURING the past few years a number of railroads have contracted a portion of their track reconditioning in sections of 40 to 80 mi., offering the contractors ample opportunities for the development of methods and machines not generally used heretofore in such work. Since the work has all been on a unit price basis, every cost-saving machine or method developed resulted in more profit for the contractor. In fact, on some of the work the contractor's costs at the beginning of the work were more than the contract unit price. It was through necessity, therefore, that some of the machines and methods used were developed.

The track reconditioning covered by this article comprises three contracts: the first, 46.27 mi., the second 49.22 mi., and the third, 33.7 mi.—all three covering work in Alabama, Georgia and Florida. The first contract was started in 1945 and the last was completed in January, 1947. Two entirely separate organizations of about 130 men each were used on each of these contracts, and direct labor cost an average of $0.80 an hour. These gangs completed the relaying, retimbering, reballasting and resurfacing of a maximum of 4 mi. of track in one week, with an average of 2.5 mi. weekly.



A Kershaw Track-Mounted, Hand-Operated Derrick, Shown Here Handling a Nordberg Spike Puller, Was of Help in Setting the Rail-Laying Equipment On and Off the Track

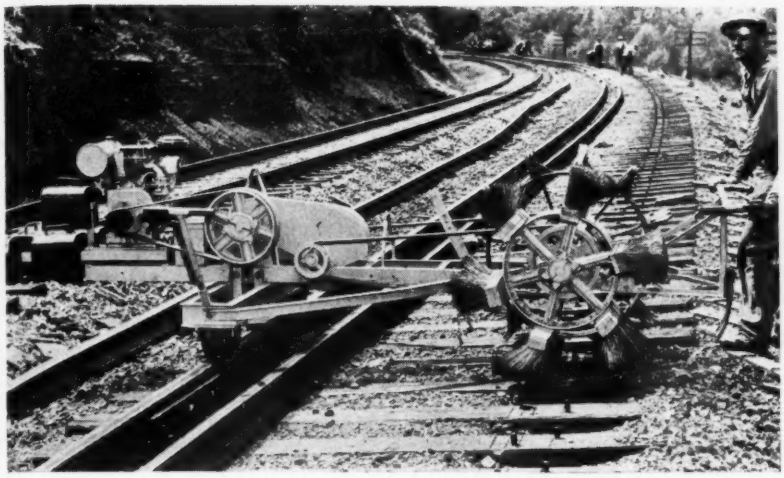
Time Studies Made

Improved methods as well as new machines were responsible for large reductions in costs between the first and last contract. The most important savings were made possible by planning and executing the work on an assembly-line basis, as in a factory. Every man had a specific job to do every day, and under no circumstances were the gangs or the men changed from one operation to other operations. As the work progressed, the men became more and more skilled, with the result that the production increase per man-hour was as high as 50 per cent.

The direct labor cost of completely relaying, retimbering, reballasting, resurfacing and dressing the 129.19 mi. of track involved in the three contracts is shown in Table No. I.

At the beginning of the first contract, methods and machines then in general use were employed on the work. As the work progressed and time studies were made, however, various experimental machines were constructed and tested. Among these

Methods and Machines



When Records Showed That Hand Cribbing Accounted for 18 Per Cent of Rail-Relaying Costs, Wheel-Type Cribbers Were Designed to Precede the Adzers and Speed Production

were a pneumatic tie spacer, a tie-bed cleaner, a tie puller, and ballast unloading chutes, all of which were later abandoned because they did not save enough time and money to justify their operation.

Detailed accurate cost records were kept of every operation, as well as of the actual production per man-hour, compared with the estimated production per man-hour. For example, whereas one tie replaced per man-hour has always been considered as satisfactory production, we found that this could be considerably increased. In making our time studies of tie replacements it was observed that six to eight men were used daily in the extra handling and redistributing of ties. By changing the method of unloading ties, six of these men were eliminated altogether, which resulted in a production increase to 1.5 ties per man-hour and a decrease of $0.20 in the cost of each tie replacement.

Relaying Rail

The rail gang was started with 50 men. Later it was increased to 73 men, and at one time 90 men were used on this work. Since production did not increase proportionately as the number of men were increased, the rail gang on the first contract was standardized at 67 men, of whom 12 men and 1 foreman were used to crib out ahead of the rail gang. Since this cribbing operation at times delayed the entire rail gang and accounted for around 18 per cent of the total cost, the first studies toward cost reduction were started here. After many experiments and the construction of several different types of machines, a wheel-type cribbing machine was adopted. This machine, which is operated by two men, reduced the rail gang force by one foreman and ten men, and eliminated the former delays occasioned by the cribbing operation.

Other savings and force reduction in the rail gang were made by the addition of a spike distributor and setter. Two of these tools, each operated by one man, distributed and set the spikes for the air hammers. Prior to their use, nine men were used to distribute and set the spikes ahead of the air hammers. A reduction of at least 15 men and 1 foreman was made by the use of the cribbing machine and spike distributors.

Many other changes were made in the number of men used in the rail gang, and the final determination as to the exact number of men to be used, in the interest of greatest economy, was reached only after exhaustive time studies of each operation. The main factor in determining the number of men to be used in the gang was the cost per foot of track relaid or the production per man-hour.

After 20 mi. of the rail had been relaid on the first contract and innumerable time studies had been made, it was concluded that 53 men, including a foreman, an assistant foreman and a mechanic, comprised the most economical rail gang. It was determined that this size gang, equipped as shown in Table II, will complete the work at the rate of one rail per minute after the line is started. Not including the installation of rail anchors, there were 16

Table No. I—Actual Direct Labor Cost of Relaying, Retimbering, Reballasting, Resurfacing and Dressing 129.19 Mi. of Track (Average Labor Rate of $0.80 Per Man-Hour).

Description of Work	Unit	First Contract 46.27 Mi. 1945-'46 Unit Cost	First Contract Man-Hours per Unit	Second Contract 49.22 Mi. 1945-'46 Unit Cost	Second Contract Man-Hours per Unit	Third Contract 33.7 Mi. 1946-'47 Unit Cost	Third Contract Man-Hours per Unit
Unload and distribute rail and accessories	Mile	$ 149.00				$ 100.00	104
Remove and relay rail	Mile	1,017.00	1,217	$1,039.00	1,298	1,202.00	1.377
Load rail and accessories		144.00	169			126.00	145
Total cost relaying	Mile	$1,310.00	1.564	$1,039.00	1,298	$1,428.00*	1,626
Unload and distribute ties	Tie	0.128	0.156	0.078	0.097	0.038	0.059
Replace ties	Tie	0.584	0.714	0.526	0.667	0.54	0.625
Dispose of old ties	Tie	0.051	0.154	0.041	0.051		
Total cost retimbering	Tie	$ 0.763	0.093	$ 0.645	0.800	$ 0.578	0.667
Spacing ties	Mile	238.00	288			411.00	474
Unloading ballast	Cu. Yd.	0.078		0.049			
First surface	Mile	597.00	719	401.00	496	633.00	736
Second surface	Mile	331.00	403				
Final surface	Mile	675.00	821	533.00	668	206.00	240
Lining track	Mile	134.00	162	84.00	108		
Dressing track by hand	Mile	328.00	387	506.00	650		
Dressing track by machine	Mile	74.00	89				
Stripping track by machine	Mile					47.00	60
Stripping track by hand	Mile	498.00	597				
Total cost resurfacing	Mile	$2,875.00	3,468	$1,524.00	1,922	$1,307.00	1,510

Note: Above costs include foremen and direct labor only, plus overtime payments. Twenty-two per cent may be added for insurance, supervision, equipment maintenance and depreciation, small tools and supplies.

*Skeletonizing (stripping) track during relaying is responsible for the higher cost of rail relaying on the third contract.

Where Skeletonizing Was Done Just Ahead of Retimbering Operations, Off-Track, Auger-Type Cribbers Did the Work. One of the Machines Is Shown Here with Its Track Wheels Raised in Clear

A Self-Propelled, Track-Mounted Ballast Plow Was Used Effectively in Regulating and Distributing the Ballast in the Area Outside the Rails, Saving 10 Men Normally Used For This Purpose

major operations in the rail laying work as set up. This meant that, at the production rate of one rail per minute, 16 min. were required after the last old rail was set out to make a closure ready for the passage of trains. On peak days this hour over a period of say six months or a year.

It is recommended that if more than 2½ track miles of rail are to be laid in one week, then another gang of 53 men with another complete set of equipment be organized and

Table No. II—Organization for Relaying Rail

Operation	*No. of Men*	*Man-Hours per day*	*Number of Machines used*
Hand adzing	1	8	1 hand adz
Removing bolts	1	8	1 Nordberg wrench
Pulling spikes	3	24	1 Nordberg spike puller
Picking up scrap	2	16	1 push car
Removing rail, tie plates	4	32	2 lining bars
Distributing tie plugs	2	16	special sacks
Driving tie plugs	2	16	1 driving plate
Cribbing	2	16	1 Kershaw Kribber
Adzing	3	24	2 Nordberg adzers
Creosoting ties	1	8	5-gal. bucket and mop
Placing tie plates	2	16	
Lining tie plates	2	16	1 tie plate liner
Setting in new rail	5	40	1 rail layer
Distributing bolts, spikes	2	16	
Placing angle bars	3	24	bar clamp
Tightening bolts	1	8	1 Nordberg wrench
Operating gage	4	32	Gage, bar and maul
Distributing and setting spikes	2	16	2 Kershaw spike distributors
Completing spiking	3	16	1 LeRoi 105-cu. ft. compressor 2 Chicago-Pneumatic spike drivers
Distributing rail anchors	1	8	
Installing rail anchors	2	16	Special mauls
Foreman	1	8	
Assistant foremen	2	16	
Mechanic	1	8	
Water boy	1	8	
Total	52		

Note—Add eight men and four Kershaw Kribbers if the track is to be skeletonized.

53-man gang laid 280 rails, an average of more than 2½ rails per man-day over 33 mi. of relaying, including lost time, delays and breakdowns. Obviously, in view of changing conditions from day to day, the only accurate basis for determining the number of men to be used in a rail gang is the production per man-

placed on the other rail following the first 53-man gang. These two gangs, with a total of 106 men, should complete 1 to 1½ mi. daily with six to eight closures. Incidentally, when only one gang is used, 30 to 45 min. are lost every time the equipment is moved back to bring up the other rail.

On the last contract, most of the track, while being relayed, was stripped of all foul ballast, using four wheel-type cribbers. Two of these machines, with the digging wheel adjusted to remove the ballast to a depth of 4 in. below the bottoms of the ties, from the center of the track outward, were placed in operation directly behind the crew removing the old rail. The two machines, operated by two men each, would remove the ballast from the cribs, on alternate rails, from the center of the track out to about the line of the old rail removed. This was done at the rate of one rail per minute, placing the ballast at the ends of the ties. Following these two machines, two similar machines, each operated by two men, removed the ballast under the removed rail to a depth of 4 in. below the bottoms of the ties and placed it beyond the tie ends. Since the ballast was not removed from directly at the tie ends, no difficulty was experienced with the track shifting or getting out of line. The cost of stripping this foul ballast with the four machines while the track was being relaid was less than $0.04 per track foot. On other skeletonizing work, a cribbing machine of the auger type was used.

Tie Replacements

Reduction in the cost of tie replacements was made largely by the unloading of the ties at the proper place. At the beginning of the first contract, a work train was called and 12 men were placed on two cars, un-

loading the ties as the train moved slowly along the work. This method resulted in an excess of ties at some places and insufficient ties at other places. Therefore, it became necessary to use six men and a push car in the timbering gangs to redistribute many of the ties to the proper place.

To avoid this extra work, the practice was started of counting the ties to be removed ahead of the unloading, and marking the number on the web of each rail with yellow keel. The work-train crew could then unload the exact number of ties to be replaced in each rail length. Since the exact number of ties was unloaded within one-half rail length of the ones to be replaced, no redistribution was necessary, and the six men otherwise required with the push car were transferred to other work.

Table No. III—Timbering Organization

Description of Work	*No. of Men*	*Man-Hours per day*
Pulling spikes on ties to be renewed	2	16
Operating jacks	2	16
Removing every other old tie with tie tongs	2	16
Cleaning tie bed	4	32
Lining ties for replacement	2	16
Pulling in new ties	4	32
Spiking new ties*	4	32
Nipping new ties†	2	16
Returning ballast for tamping	4	32
Operating jacks and level-board	2	16
Tamping new ties	8	64
Foreman	1	8
Assistant foreman	1	8
Total	38	

*Chicago Pneumatic air compressor and two spike drivers used in this operation.

†This operation performed with Kershaw pneumatic tie nipper.

Twelve men and one foreman were used to unload ties direct from the cars to the exact spot required. Four men were placed in each of three gondola cars, and the cars were spotted over three rail lengths. After the exact number of ties had been unloaded for each rail length, the work train would move ahead and stop over the next three rail lengths. Using this method, ties were unloaded at the rate of 25 per man-hour, or at a cost of $0.04 each, as compared with an estimated cost of $0.22 each when unloaded by the former method and then redistributed by the timbering forces.

Timbering was accomplished under a 25-m.p.h. slow order by either of two methods—"surfacing in," independent of the rail laying, or renewing the ties immediately behind the rail gang, after the track had been stripped of all ballast during the rail laying operations. One foreman, one assistant foreman and 36 laborers were normally used in each timbering gang (Table III), and replaced from 400 to 450 ties daily.

No ballast was unloaded until at least 20 to 30 cars were on hand. In short, no operation was started unless there was a full day's work ahead for one gang. The ballast unloading gang normally included eight men. All ballast was received in hopper-bottom cars, necessitating the use of chains on the doors and a crosstie ahead of the wheels during unloading. The ballast unloading gang spaced ties in the morning while waiting for the work train, which did not arrive on the job until around 11 a.m. In open track it is very important to go over the track prior to unloading ballast and straighten and space the ties.

Ten cars of ballast were taken out and unloaded one by one. The dumping at more than a single door at a time resulted in the placing of excessive ballast. The unloading was never pushed or speeded up. The aim was to unload the ballast as uniformly as possible so that the surfacing gang would have a minimum of unnecessary work in redistributing it. Unloading as described required five man-hours per car of ballast unloaded.

First Raise

Immediately behind the ballast unloading, the first raise of four to six inches was started under a slow order of 25 m.p.h. During each day the track was cleared for the passage of six to eight trains. While the gang employed in this work first comprised 22 men, the force was later reduced to 16 men as shown in Table IV.

This reduction in the surfacing crew was accomplished through the development and use of a V-shaped plow directly behind the ballast unloading and ahead of the surfacing gangs. This plow was used to remove the excess ballast between the rails, leaving only sufficient ballast for the tamping operations. As the plow removed the excess ballast, it also filled in any empty tie cribs. Dressing and ballast-distributing wings on the plow were used after the center plowing to distribute the ballast uniformly along the track shoulder and ahead of the surfacing.

Table No. IV—Organization of Surfacing Gang

Description of Work	*No. of Men*	*Man-Hours per day*
Operating Nordberg hydraulic jack	1	8
Tamping jack	4	16
Operating one Jackson 8-unit electric tamper	8	64
Operating generator	1	8
Water boy	1	8
Utility man	1	8
Foreman	1	8
Total	16	120

Prior to the development of this ballast plow and distributor, 8 to 12 shovelmen were used to fill in the empty cribs and to remove excess ballast between the rails. In addition to the saving of eight men in the surfacing gang, the production of this gang was increased.

The final surface was scheduled 30 to 40 days behind the first surface to allow traffic to develop a firm bed for each tie. Directly ahead of the final surfacing gang sufficient ballast was unloaded for the final two-inch lift. The ballast plow again followed the ballast unloading and removed the excess ballast between

A Kershaw Pneumatic Tie Nipper, A Self-Propelled Air Compressor and Air Hammers Were Used in All Retimbering Operations

the rails, leaving just the exact amount of ballast for the raise to be made.

As in the case of the initial raise, the use of the plow resulted in large savings in making the final surface. Prior to its use, 10 to 24 men were loaded by work train and then the ballast plow would remove the ballast from between the rails and place it on the shoulders where it was regulated, distributed, and shaped by the dressing wings.

Based on the methods and machines used on this work, and assuming that the track reconditioning will be planned and executed with the number of men set out in Table No. V and completed in sections of not less than 30 mi., Table No. VI may be used as a basis for estimating the total direct labor cost of track rehabilitation.

Table No. V—Suggested Organization for Completely Relaying, Skeletonizing, Retimbering, Cleaning Ballast, Reballasting and Resurfacing About 2½mi. of Track Weekly.

Description of Work	*Organization Required*
FOR RELAYING	
Distributing and picking up rail and metal	1 foreman, 12 men
Removing and relaying rail	1 foreman, 2 asst. foremen, 50 men, 1 mechanic
Skeletonizing track during relaying	8 men
Total for relaying	4 foremen, 70 men
The organization above may be placed on one rail followed by another organization on the other rail. If this is done, production per man-hour will increase 15 to 25 per cent.	
FOR COMPLETE RECONDITIONING	
Skeletonizing track	1 foreman, 10 men
Replacing ties	1 foreman, 36 men
Cleaning ballast	1 foreman, 4 operators
*Unloading ballast	1 foreman, 8 men
First surface	2 foremen, 32 men
Final surface	2 foremen, 32 men
Dressing and completing	1 foreman, 4 men
Total for reconditioning	9 foremen, 99 men

*This gang may be used to space and straighten ties in the mornings or during the time it is waiting for the ballast train. It also may be used as a floating gang to catch up odd jobs, pile and burn old ties, etc.

Assuming that a 100-man gang will recondition 2 to 2½ mi. weekly, or say 75 mi. yearly or a season, then 300 mi. of track work could be assigned to this particular gang on a four-year reconditioning cycle. This would naturally result in slow orders every 300 mi. as compared with every 25 to 75 mi. when the retimbering and resurfacing operations are carried out by the regular section forces.

Still another possibility worth serious consideration is the loaning or swapping of these out-of-face reconditioning gangs between the northern and southern roads, working in the south during the winters and in the north during the summers. The only regular maintenance forces would be gangs of one foreman and three to four men covering sections of 10 to 20 mi.

To realize these substantial savings, certain policies must be adopted. The most important are:

(a) The installation of a cost-control system, with minimum performance standards for each operation involved in track reconditioning.
(b) Centralized control of all planning, material scheduling and delivery.
(c) Relaying, retimbering, reballasting, resurfacing to be done by extra gangs periodically, using production methods and equipment.
(d) Small maintenance forces to patrol the track, clean ditches, tighten bolts, pull low joints or spots, and be responsible for other necessary odd jobs.

The reconditioning cycle will depend, of course, on the density of the traffic, but it is believed that complete reconditioning every four years will carry the heaviest traffic and that every six years will carry normal traffic.

In conclusion, it is suggested that railway maintenance officers spend more time and money on the development of new methods and machines; encourage and promote young engineers with no experience but with plenty of imagination and energy; give revolutionary ideas serious study and trial; and make time-studies, as manufacturers continually do, to know the cost of unloading a tie or surfacing one foot of track, rather than the cost of maintaining one mile of track one year. Take the initiative—do not wait for some other road to try out a new method, idea or machine.

Dressing Track

At the beginning of the work, a foreman and 14 men were used to regulate the ballast, fill in the tie heads, and shape the ballast slope. This gang completed approximately 1200 ft. daily to the desired cross section. Dressing the slope and regulating the ballast required the most time. Two push cars with ballast dumps were used to regulate and distribute the ballast.

After the ballast plow was placed in operation, this gang was reduced to four men. The ballast plow would be used in the mornings ahead of the final surfacing gang, plowing out excess ballast between the rails and regulating the ballast along the shoulders. In the afternoons it would be placed behind the surfacing gang and, with the four men, would completely dress and regulate the ballast slopes on all the work completed that day by the surfacing gang.

Quite frequently it was necessary to unload additional ballast behind the final surfacing gang in order to have sufficient ballast to dress the track to the full section required. Where this was necessary the additional ballast required would be unused ahead of the surfacing to remove excess ballast, and the cost of doing this work was almost as much as the cost of the surfacing. After the plow was placed in operation the final surfacing gang was reduced from 24 men to 16 men, and average production increased from 1200 ft. a day to 1800 ft. a day.

Table No. VI—Total Direct Labor Cost in Rehabilitating One Mile of Track (Rate Used $1 per Man-Hour).

	Unit	*No. of Units*	*Man-Hours*	*Unit Cost*
Unload, distribute rail and accessories	Mile	1	110	$ 110.00
Remove, relay rail	Mile	1	1,250	1,250.00
Skeletonizing track (during relaying)	Mile	1	200	200.00
Load rail, accessories	Mile	1	160	160.00
Total for relaying	Mile	1	1,720	$1,720.00
Renewing ties (400 per mile)	Mile	400	282	$ 282.00
Skeletonizing track	Mile	1	520	520.00
Cleaning ballast	Mile	1	520	520.00
First surface	Mile	1	600	600.00
Unloading ballast (500 cu. yd. per mile)	Cu. yd.	500	50	50.00
Final surface	Mile	1	600	600.00
Lining track	Mile	1	120	120.00
Dressing and completing	Mile	1	150	150.00
Total for retimbering and reballasting	Mile	1	2,842	$2,842.00
Total direct labor cost of rehabilitation per mile of track				$4,562.00

Note—For depreciation on equipment, gas, oil, insurance, and federal old-age benefits or pension fund, 20 or 30 per cent should be added to the direct labor cost.

Mechanization Changes Many Safety Problems

By S. L. CHAPIN

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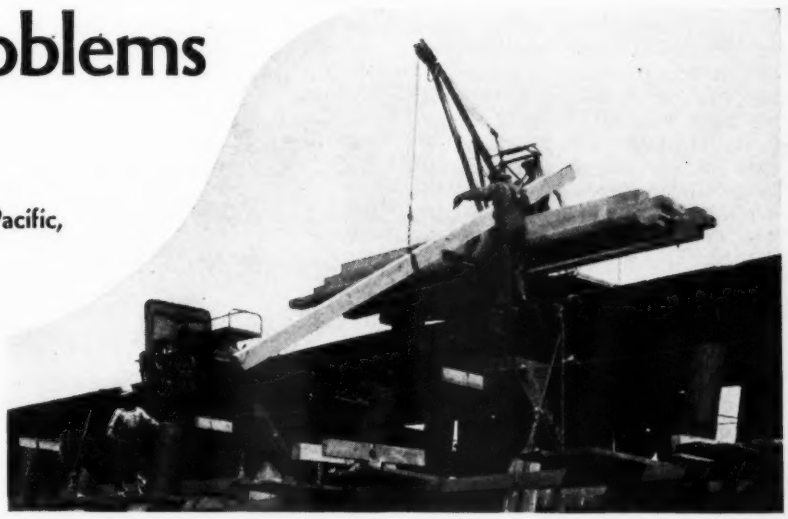


The Small Push-Car Crane Is One of Many Units of Equipment that Have Eliminated Numerous Back-Breaking Tasks and the Hazards Incident to Them

To what extent has the increased mechanization of the maintenance-of-way forces affected the problem of accident prevention? What are the new problems presented? These questions are answered in this article by the author, who cites numerous examples with respect to specific machines and power tools used by both the roadway and bridge and building forces. The importance of qualified operators, adequate supervision, careful equipment maintenance and safety education is also pointed out.

THE progress made by the railroads of the country in the development and utilization of more efficient and safer equipment and methods during recent years, in spite of the war, is an outstanding tribute to the sincerity and ingenuity of the industry. The mechanization of the maintenance-of-way forces has greatly increased their efficiency and, in many cases, has been an important contributing factor in bringing about the high maintenance standards necessary for today's train speeds. Furthermore, mechanization of the maintenance-of-way forces has eliminated or decreased many specific types of personal injuries, but, at the same time, it has produced new safety problems that require a new concept of accident prevention, far more technical than before.

A detailed discussion of the utility, accident-eliminating possibilities and accident-prevention problems presented by almost any class of maintenance-of-way work equipment, such as the air and electrically-powered tools used in bridge work, portable gasoline-engine-driven tools for track work, and various on and off-track power plants, rail-laying cranes, etc., would require, in itself, an article of considerable length. Therefore, the following will be limited to a brief discussion of the more recent types of work equipment and the changes they have brought about.

The preframing of bridge timbers at a central plant, and the dapping of bridge ties on the job by portable power saws, have practically eliminated many serious injuries that were due formerly to extensive use of the hand adze. The two types of saws generally used, where the adze was formerly practically indispensable, are the hand-held electric or air-driven saw, and the pull-out radial saw. In the latter the saw blade should be properly guarded, power controls should be so located that the operator will not have to reach over the saw to turn the power on or off, and goggles or a face shield should be worn.

Guard Operating Switches

The hand-held power saw, while greatly increasing productivity in the framing of lumber and smaller timbers can, if carelessly handled, result in serious injury. These saws should be equipped with an automatic guard, and the trigger, or operating switch, should be so located that it cannot be started accidentally when the saw is lying down. Also, the material to be cut should be firmly secured against inadvertent movement. In the case of the portable version of the ordinary saw table, which is coming into wider on-the-job use, the saw blade should be properly guarded and, when used for ripping, a splitter and anti-kickback dogs should be provided.

The chain saw, whether air, gasoline-engine or electrically driven, is being used extensively for the cutting of heavier timbers and piles, and has probably eliminated more plain hard labor on bridge and trestle work than any other power-driven tool. Since it is not possible to guard these saws to the same extent as those with circular blades, extreme care is necessary in their operation. Even on rather large pile-driving jobs, only one saw of this type will be found necessary, and a team of two carefully-trained men to operate it is probably the best safety precaution that can be taken.

Air and electrically-powered drills and impact wrenches are other tools that have decreased the possibility of accidents while increasing the efficiency of bridge and building gangs. With some of the heavier

types of these tools, it will, at times, be found advantageous to counterweight them for ease in handling, and, as in the case of power saws, the trigger, or starting switch, should always be so located that it cannot be started accidentally.

The importance of this latter precaution is seen clearly in the following serious accident resulting from the use of a power drill. A carpenter was engaged in drilling tunnel posts for lag screws used to hold concrete forms in place. The air drill being used was counter-weighted for ease in handling and was operated by this one man from a ladder. While the man was descending the ladder, with the drill held against his body with one hand, the motor was accidentally started and the bit caught in the bib of his overalls. His attempt to draw away brought the point of the drill against him and before the air could be shut off it had passed entirely through his body. This is an example of one type of accident that would have been prevented by a safe starting mechanism.

Ground Electric Tools

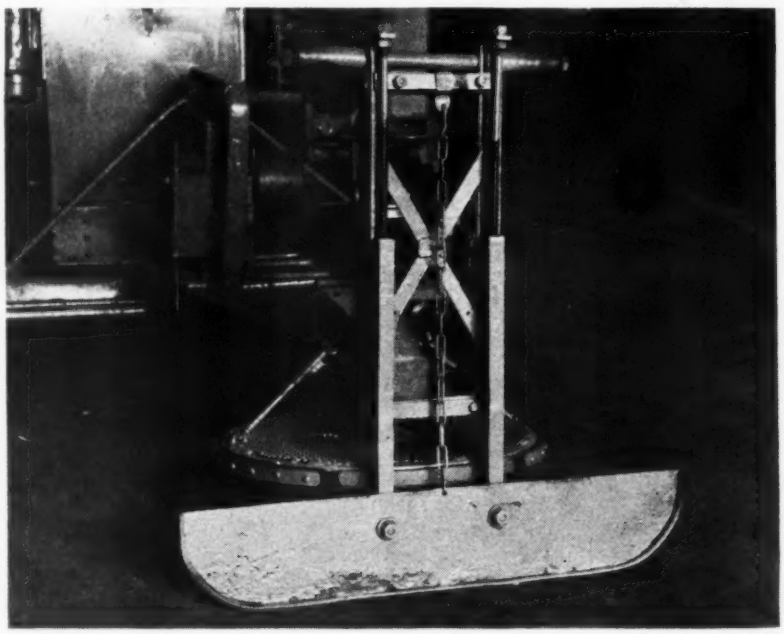
All hand-held electrically-driven tools should be adequately grounded, regardless of whether the source of power is the regular commercial supply or is provided by a portable generator. The best method of doing this is to provide a three-wire cord and a three-way, or polarized, connection. Practically all such tools now come equipped with the three-wire cord. However, where older tools are in use, and are not so equipped, an additional wire should be attached to the frame of the tool and run to an effective ground.

Another piece of equipment that has eliminated much back-breaking labor, and such types of injuries as strains, ruptures and foot injuries, is the small push-car crane. Sometimes powered by a small gasoline or air motor, and with sufficient capacity to handle a large stringer, these cranes are now used extensively on bridge and trestle repair jobs where the use of a large crane would not be economical. We all know that the elimination of the old bull-gang method of handling materials has reduced accidents. However, when using push-car cranes the same safety precautions, time proven for all hoisting equipment and the larger power cranes, should be employed.

Mechanization of the track forces, while keeping pace with new developments in other departments, has required a high degree of resourcefulness because, with few exceptions, each power tool or piece of equipment has had to be especially designed from the ground up to perform a specific task. Mechanical tie cribbers, spike drivers, spike pullers, cross grinders, bolting machines and various other types of machines, while adding greatly to the productivity of the track forces, have not greatly changed the picture insofar as personal injuries are concerned. In themselves they present no great problem from an accident-prevention standpoint, but it is important to see that all gears, belts, pulleys, etc., are properly guarded.

Guards for Adzers

The power tie adzer, while a tremendously efficient machine and eliminating the hazard of cut feet due to large numbers of inexperienced men using the hand adze, presents several possibilities for serious injury if proper care is not taken in its operation. The adzer should be operated only by a man trained in its use, and not only the operator, but all others working in the vicinity of the machine, should be provided with goggles. Efficient guarding of the cutter head of this machine presents a problem. In addition to the basket guard regularly provided over the cutter head, one large railroad has equipped its adzers with a metal cutter guard placed outside the frame, below the operating handles, and so arranged with a telescoping mounting that the bottom of the guard, which is parallel to the rail, is always in contact with the top of the tie being adzed. This guard so protects the operator that the wearing of shin or toe guards is not necessary.



One Large Road Has Equipped Its Power Adzers With Metal Guards, Placed Outside the Frame, as Shown in This View. The Mounting Is Such that the Bottom of the Guard Is Always in Contact With the Top of the Tie Being Adzed

Multiple-tool pneumatic tie tampers for out-of-face work with large gangs have been with us for some time, but of more recent development is the single-unit gasoline-driven tamper and two or four-unit electric or pneumatic outfits for section gangs. These have eliminated frequent eye injuries due to flying rock chips while pick tamping, and also the all-too-common and often serious injury resulting from an individual worker contacting himself or another with the pick. But they do add the hazard of noise about the workmen and thus call for adequate protection to warn the men of approaching trains.

Both on and off-track rail-laying cranes have become a practical necessity with the continuing increase in the weight of rail. The handling of heavy rail by hand with tongs can be a prolific source of personal injuries, such as strains, ruptures and mashed feet.

While heavy lifting is eliminated by the use of cranes, other safety precautions become necessary with their use. Most injuries occur when men fail to keep their feet or other parts of their bodies from under the rail or other material being handled, or fail to place their hands properly

so as to avoid injury. No one other than those assigned to the crane should be allowed to ride on it, and even those assigned to the crane should ride it only when absolutely necessary. No one, of course, should be allowed to get on or off the equipment while it is moving. In the case of all lifting equipment, particular attention should be paid to the rigging, cables, sheaves, frictions and brakes to guard against possible failure, even though the equipment may be new.

Protection Against Trains

While we have discussed the advantages and disadvantages of some power tools and machines from the standpoint of preventing accidents caused by the machines themselves, a large part of the picture is the safeguarding of the equipment, and the men operating it, against train movements. When the larger on-track machines, such as cranes, ballast cleaners, power jacks, etc., are in use, full flag protection is, of course, provided, even though the track structure may not be sufficiently disturbed to prevent the passage of trains. In the case of pneumatic tie tampers and other equipment where the volume of noise is such that approaching trains cannot readily be heard, watchmen should be stationed, as necessary, to look out for such trains and warn the men operating the tools in sufficient time to allow them to get in the clear. In some obscure locations it may be necessary to station lookout men at points of vantage away from the gang, and provide a system of visible signals to inform other watchmen at the gang of approaching trains.

With the possible exception of the smaller power tools, only operators trained in their use should be assigned to the various machines in the interest of safety and efficiency. While some qualified men may be hired as machine operators, generally speaking, they are selected from men already employed in the various gangs. Therefore, it is not only necessary for the gang foreman and the roadmaster or supervisor to understand the function of the various machines or power tools, but to have a working knowledge of their operation so they can train operators and see that the equipment is used properly and safely.

Probably one of the most outstanding changes that has taken place with mechanization of the maintenance-of-way forces is the shift to trucks, wherever possible, for the transportation of men, tools and materials. Taking to the highway has greatly increased the efficiency of many gangs through the saving in travel time involved, and has reduced the hazard of motor-car operation, but it has not eliminated or necessarily reduced the possibility of personal injury to employees.

Where men are transported by truck, particular attention should be paid to the selection of the driver. He should, of course, be a licensed chauffeur and familiar with the traffic laws of the state in which he is located. At the same time, he should be physically able, and have a good sense of responsibility.

On all trucks used to transport men, secure seats should be provided and the seating capacity should not be exceeded. If the trucks have open sides they should be equipped with side rails, and in each case a guard chain should be provided across the rear. A ladder or steps, either portable or attached to the truck, should be provided for safe entrance and exit. Furthermore, the men should be instructed to remain seated and not get on or off while in motion.

The use of dump trucks for the temporary transportation of men is permissible provided the body is locked down and the tail gate is kept closed. The men, of course, should be safely seated and should not be allowed to stand up in the truck. When both men and material or tools are transported in the same truck, particular attention should be paid to the loading and securing of the tools and material so they cannot shift and endanger the men if the truck should lurch or make a sudden stop.

Repairs Important

As mechanization of the maintenance-of-way forces has increased, the safe and efficient maintenance and repair of the equipment has presented an important problem. While some smaller roads are able to handle much of this all-important work with such facilities as are to be found at signal or other shops, and by passing the larger equipment along to the mechanical department, many of the larger systems have found it necessary to build up entirely new organizations within their maintenance-of-way departments to handle the work. The facilities of such organizations usually include a centrally located system shop equipped to handle the repair and re-building of all types of equipment, from power tools on up to the heavier units, such as cranes and power shovels. Each division often also has shop facilities to handle repairs of the smaller equipment, and working out of these division shops are repairmen who regularly inspect the equipment and make such necessary running repairs as are possible in the field.

Handling Fuel

Another important consideration that has come about with the increased mechanization of the maintenance forces is the transportation and storage of gasoline and Diesel fuel. The railroads as a whole have definite and comprehensive rules covering the handling and storage of flammable liquids. However, these rules are of no value unless they are definitely brought to the attention of those handling such liquids and compliance with them is enforced.

Investigation of a recent accident on one railroad involving the mishandling of gasoline disclosed the following facts:

A gang had returned to camp by truck after dark and the foreman had instructed a laborer to fill the gas tank of the truck so as to be ready for the next day. The man secured a kerosene lantern and entered the tool car where the gasoline was stored in drums, and attempted to draw gasoline from a drum into an open bucket, although a safety can was available. He attempted to use a pump furnished for the purpose, but when the pump proved to be inoperative he proceeded to siphon the gasoline by means of a short length of hose. The bucket was partially filled when the gasoline was ignited by the lantern. In the resulting fire the man was badly burned and the property damage was extensive.

To preclude the possibility of such accidents, one railroad, insofar as possible, has installed electric lights in all tool houses or other places where flammables are stored, and for use where electricity is not available has developed a low-amperage, battery-powered electric light.

As the use of power tools and equipment has increased, so has the complexity of the accident-prevention program. As the result, it is too much today to expect the maintenance-of-way supervisory officer to handle all the ramifications of the necessary safety program without the help of the safety department. The safety department has become an invaluable aid to the supervisor by furnishing him with data on the safety precautions to be taken with various types of equipment; also in assisting him in the on-the-job instruction of his men by the holding of safety meetings at which specific problems can be discussed and the instructions enhanced by the use of visual educational material.

Armstrong Chinn, *President, A.R.E.A.*

Urges Attendance at

Our readers receive invitation to take part in this group's three-day session at Chicago, March 16-18. Program includes many reports and addresses on timely subjects

PRESIDENT CHINN SAYS—

I appreciate this opportunity afforded by *Railway Engineering and Maintenance* to extend to railway engineering and maintenance officers throughout the United States, Canada and Mexico a cordial invitation to attend the annual meeting of the American Railway Engineering Association in Chicago, March 16–18. Your publication reaches all or most of our members, and thus this will serve as a last-minute reminder to them as well as hundreds of others engineering and maintenance officers who would benefit—and in turn their railroads—if they would become associated with us and take part in our committee studies and annual meetings.

In a recent issue of the A.R.E.A. News I directed a message to each A.R.E.A. member, urging him to attend our forthcoming convention. Therefore, I address this invitation especially to those of you who are not members, to be sure that you sense the same welcome to our meeting, for what you may contribute and for the certain benefit that will accrue to yourself and your company.

In our annual meeting, which culminates the past year's work of our many standing and special committees, we sit, as it were, around a round table and review, discuss and pass upon the many committee reports, and listen to papers and addresses on particularly timely or pressing problems. And this year we have an unusually strong and interesting program, as we will consider at length the cumulative effect of the research program that has been carried out by the association on an ever-increasing scale during the last six or eight years. Also, before, between and following these sessions, our annual meeting will afford you and other railway engineering and maintenance men from all parts of the country the best opportunity of the year to exchange ideas first-hand concerning the latest developments in engineering and maintenance materials, equipment and practices, and your special problems.

Of great value too in attending our annual meeting will be the opportunity which will be afforded you to visit and inspect the large and comprehensive exhibit of the National Railway Appliances Association at the International Amphitheater—held in conjunction with our meeting—where you will have an unequalled opportunity to bring yourself up to date on the latest materials, equipment and devices designed specifically to aid you in your work.

All in all, March 16-18 in Chicago offers you inestimable value for the taking, and I know that I am joined by all of the other officers and the directors of our association in this invitation to you to meet with us if you possibly can. We especially welcome you to those sessions at which subjects most closely related to your specific work will be considered.

THE WEEK of March 15 will be Railway Engineering Week in Chicago for engineering and maintenance officers of the railways of the United States and Canada. Featured will be the three-day annual meeting of the American Railway Engineering Association, beginning on Tuesday morning, March 16, and ending at noon on Thursday, March 18, and the coordinated exhibition of the National Railway Appliances Association which begins Monday morning and ends Thursday afternoon. As in past years, the A.R.E.A. meeting will be held in the Grand Ballroom of the Palmer House.

Confronted with continuing high traffic volume on the railways and the inflationary trend that has greatly increased the cost of labor and materials for all classes of construction and maintenance work, those attending the convention will have many new and recurring problems to consider—problems that will be clearly reflected in the many committee reports and addresses that are encompassed in the three-day convention program. Altogether, 21 committees will make reports on a total of 97 assignments, dealing with practically every phase of railway construction and maintenance. In these reports, to a greater extent than ever before, will be reflected the cumulative effect of the research program that has been conducted or supported by the association on an expanding scale during the last six or eight years.

Under the direction of President Armstrong Chinn, the opening session of the meeting will convene at 9:45 a.m. on Tuesday, and will be featured by an address by J. H. Aydelott, vice-president, Operations and Maintenance department, Association of American Railroads.

at A.R.E.A. Annual Meeting

Reconvening at 2 p.m., the afternoon session on Tuesday will hear three important committee reports, but will be adjourned early in order to permit those in attendance to view the exhibition of the N.R.A.A. which, this year, will be held at the International Amphitheatre.

Wednesday's sessions, both morning and afternoon, will deal primarily with subjects relating to roadway and track—the morning session ending with an address by Rockwell Smith, Research Staff, A.A.R., on The Treatment of Sliding Fills by Grouting. Ending the afternoon session will be two special features in the discussion of investigations in progress at the University of Illinois, by R. E. Cramer, special research associate professor, U. of Ill., and R. S. Jensen, special research associate of engineering materials, U. of Ill., and an address by G. K. Manning on the Shelly Rail Study at Battelle Memorial Institute. Among the investigations at the University of Illinois to be discussed will be those on rolling load tests of joint bars; corrugated rails; shelly rail studies; fatigue of rail webs; and fissures in rails. The highlight of Wednesday's program will be the annual luncheon, which will be addressed by Clark Hungerford, President of the Frisco.

Special features of the program on Thursday will be addresses by Dr. Ruth D. Terzaghi on Surface Deterioration of Concrete, and by R. B. Peck, University of Illinois, on Some Factors Influencing Failures of Abutments and Retaining Walls.

All of the regular sessions of the meeting will be presided over by President Chinn of the Association, who is also president of the Terminal Railroad Association of St. Louis, assisted by Vice-President C. H. Mottier, vice-president and chief engineer of the Illinois Central. Reproduced on the opposite page is a statement by President Chinn extending a special invitation to the readers of *Railway Engineering and Maintenance* to attend the meeting. In it he points out that the annual meeting will afford railway engineering and maintenance officers from all parts of the United States and Canada the best opportunity of the year to exchange ideas first-hand concerning the latest developments in engineering and maintenance materials, equipment and practices, and their special problems.

Program

47th Annual Meeting

Palmer House, Chicago

Tuesday, March 16

MORNING SESSION—9:45 A. M.

Address by Armstrong Chinn, President
Reports of the Secretary and Treasurer
Address by J. H. Aydelott, Vice-President, Operations and Maintenance Department, A.A.R.
Address by J. A. Beoddy, Chairman, Signal Section, A.A.R.
Address by K. H. Gordon, Chairman, Electrical Section, Engineering Division, A.A.R.
Reports of Committees on
- Economics of Railway Location and Operation
- Highways
- Buildings

AFTERNOON SESSION—2:00 P. M.

Reports of Committees on
- Cooperative Relations with Universities
- Yards and Terminals
- Water Service and Sanitation

Adjournment to visit N.R.A.A. Exhibit

Wednesday, March 17

MORNING SESSION—9:00 A. M.

Reports of Committees on
- Maintenance of Way Work Equipment
- Economics of Railway Labor
- Ties
- Wood Preservation
- Roadway and Ballast

Address by Rockwell Smith, Research Staff, A.A.R., on The Treatment of Sliding Fills by Grouting

ASSOCIATION LUNCHEON—12 O'Clock

Address by Clark Hungerford, President, St. L.-S. F.

AFTERNOON SESSION—2:30 P. M.

Reports of Committees on
- Track
- Rail

Discussions of Investigations in Progress at the University of Illinois, by R. E. Cramer and R. S. Jensen
Address by G. K. Manning on the Shelly Rail Study at Battelle Memorial Institute

Thursday, March 18

MORNING SESSION—9:00 A. M.

Reports of Committees on
- Uniform General Contract Forms
- Records and Accounts
- Waterproofing

Address by Dr. Ruth D. Terzaghi on Surface Deterioration of Concrete
Report of Committee on
- Impact and Bridge Stresses

Installation of Officers
Report of Committee on
- Masonry

Address by Dr. R. B. Peck, U. of Ill. on Some Factors Influencing Failures of Abutments and Retaining Walls
Reports of Committees on
- Iron and Steel Structures
- Clearances
- Wood Bridges and Trestles

Our Readers Are Invited to

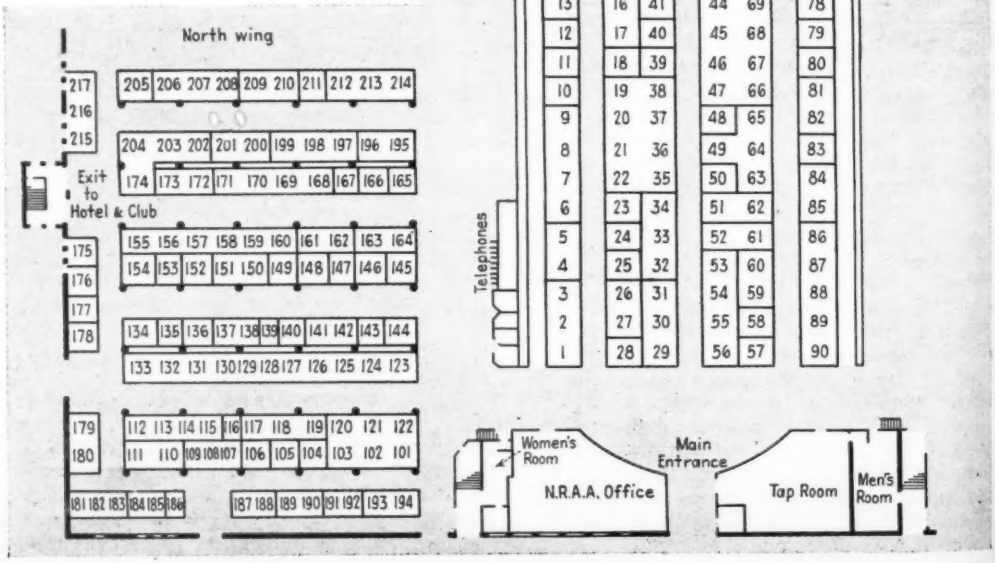
WITH MORE than 100 member companies participating, the thirty-ninth annual exhibit of the National Railway Appliances Association will be held at the International Amphitheatre, Chicago, March 15-18, coincident with the annual meeting of the American Railway Engineering Association. This exhibit of equipment, materials and devices used in the construction and maintenance of railway tracks, bridges, buildings and water service facilities will be open four days beginning on March 15 (one day ahead of the convening of the A.R.E.A. meeting) and extending through Thursday, March 18.

On each of these days the exhibit will be open from 9 a.m. to 6 p.m., except that on Thursday it will close at 3 p.m. For the convenience of those wishing to view the exhibit, free bus service will be operated between the Palmer House (site of the A.R.E.A. meeting) and the exhibit hall.

The exhibit is being directed by C. L. Mellor (Barco Manufacturing Company), as president of the N.R.A.A., and R. B. Fisher (Buda Company) as secretary, director of exhibits, and chairman of the association's Exhibit committee. A list of the companies that will participate in the exhibit, with their booth numbers, is presented here, together with a floor plan of the exhibit hall, showing the exhibit spaces and their respective numbers.

List of Exhibitors

Achuff Railway Supply Company 143
Air Reduction Sales Company 12
Allied Chemical & Dye Corp., General Chemical Division 177
Allis-Chalmers Manufacturing Company 212-213-214
American Fork & Hoe Co. 48
American Hoist & Derrick Co. 73-74
Armco Drainage & Metal Products, Inc. 25
Austin-Western Company 40
Barber-Greene Company 209-210
Barco Manufacturing Company 57
Bernuth, Lembcke Co., Inc. 77
The Buda Company 29-30-31
Caterpillar Tractor Co. 155-156-157-158-159-160
Chicago Pneumatic Tool Company 187-188
Chipman Chemical Company, Inc. 179-180
Crerar, Adams & Co. 80
Cullen-Friestedt Company 50
Dearborn Chemical Company 4-5
Henry Disston & Sons, Inc. 154
The Duff-Norton Manufacturing Company 71-72
Duncan Wire Stretcher Company 185½
Eaton Manufacturing Company 75-76
Electric Tamper & Equipment Co. 101-102-103-120-121-122
Encyclopedia Britannica 149
Eutectic Welding Alloys Corp. 184-185
Fabreeka Products Company 178
Fairbanks, Morse & Co. 19-20-21-22-35-36-37-38
Fairmont Railway Motors, Inc. 43-44-45-46-47-66-67-68-69-70
Harnischfeger Corporation 168-169-170-171
Hayes Track Appliance Co. 83
Hobart Bros. Company 206-207-208
Hubbard & Co. 58
Independent Pneumatic Tool Company 172-173
Industrial Brownhoist Corporation 39
Ingersoll-Rand Company 32-33-34
Insley Manufacturing Corporation 13-14
International Harvester Company 86-87-88-89-90
Johns-Manville Sales Corp. 1-2-3
O. F. Jordan Company 41
The Joyce-Cridland Company 84-85
Kalamazoo Manufacturing Company 51-62
The Kershaw Company, Inc. 181-182-183
Koehring Company 117-118-119



Floor Plan of the Exhibit Hall in the International Amphitheatre, Showing Booth Numbers

N.R.A.A. Exhibit

President of manufacturers' group extends welcome to inspect the extensive display of equipment and materials that will be on view during the A.R.E.A. meeting

Koppers Company 215-216-217
The Lehon Company 152
LeRoi Company 110-111
Littleford Bros., Inc. 106
Locomotive Finished Materials Company 211
Magnus Chemical Company, Inc. 200-201
Maintenance Equipment Co. 59-60
Mall Tool Company 11
Marvel Equipment Company 205
The Master Builders Company 107-108-109
Mid-West Forging & Mfg. Co. 140
Modern Railroads 139
Monroe Railway Appliance Company 135
Morden Frog & Crossing Works 26-27
Morrison Railway Supply Corp. 165
The Murdock Mfg. & Supply Co. 176
National Aluminate Corporation 15-42
The National Lock Washer Company 18
The Nichols Engineering Co. 175
Nordberg Manufacturing Company 123-124-125-126-127-128-129-130-131-132-133
The Oxweld Railroad Service Company 81-82
The P. & M. Co. 28
Pettibone Mulliken Corporation 6-7-8-9
Philadelphia Steel & Wire Corp. 116
Pittsburgh Pipe Cleaner Company 166
The Pocket List of Railroad Officials 145
Power Ballaster Division, Pullman-Standard Car Manufacturing Company 174-202-203-204
Punch-Lok Company 137-138
Racine Tool & Machine Co. 144
The Rail Joint Company, Inc. 52-61
The Rails Company 134
Railroad Accessories Corporation 79
Railroad Equipment Magazine 153
Railroad Products Company 104
Railway Engineering and Maintenance 136
Railway Maintenance Corporation 16-17
Railway Maintenance Devices Company 189-190
Railway Purchases and Stores 147
Railway Track-work Company 195-196
Ramapo Ajax Division, American Brake Shoe Co. 53-54-55-56
Reade Manufacturing Company 161-162
The Ric-Wil Company 141-142
Rodgers Hydraulic, Inc. 148
Rust-Oleum Corporation 23
Schramm, Inc. 78
Sperry Products, Inc. 150-151
Taylor-Colquitt Co. 191-192
Teleweld, Inc. 146
Templeton, Kenly & Co. 10
Thornley Railway Machine Co. 105
Timber Engineering Company 186
Union Metal Manufacturing Co. 167
Unit Crane & Shovel Corp. 197-198-199
United States Steel Corporation 49-63-64-65
The Warner & Swasey Co. 112-113-114-115
Western Railroad Supply Co. 193-194
Woodings-Verona Tool Works 163-164
Woolery Machine Co. 24

C. L. Mellor, *President, N.R.A.A.*

PRESIDENT MELLOR SAYS—

I welcome this opportunity to extend to you—the readers of *Railway Engineering and Maintenance*—on behalf of the officers and directors of the National Railway Appliances Association, a cordial invitation to attend the Thirty-Ninth Annual Exhibition of our association, to be held at the International Amphitheatre, Chicago, March 15-18, in conjunction with the annual convention of the American Railway Engineering Association.

Again, for the thirty-ninth time, and the second time since the war, we are planning an exhibit which we are sure will be of great value to you. In it, the important manufacturers will display for your consideration and examination a wide range of materials and almost every conceivable type of power tool and machine to facilitate and reduce the cost of your work—whether related to tracks, bridges, buildings or water service.

As most of you are aware, I am sure, the last few years have witnessed outstanding developments in almost every type of material, machine or appliance offered to the railways—for which our member companies can claim much of the credit. As a result, among those products exhibited will be many new and improved types and models that have never been displayed before.

Working together, our officers and directors have developed a show which, in scope and interest, we anticipate will surpass any in the past. Everything possible has been arranged for your convenience, including restaurant facilities at the International Amphitheatre and free bus service on a 10-minute schedule between the Amphitheatre and the hotel headquarters of the American Railway Engineering Association convention.

Please consider this a personal invitation to visit our exhibit. You will receive a cordial welcome from each and every exhibitor, and there will be plenty of representatives on hand to give you full information and render every service possible.

March of Machines

In these pages is presented a graphic recapitulation of most of the new and improved equipment described in this publication since March, 1947

(1) Above—New cab designed for use on various models of motor cars. Made of sheet metal, cab can be used on cars with or without condensers. *Fairbanks, Morse & Co.*

(2) Below—Cribex machine for ballast excavation. One of three units which can be leased by the railways for renovating ballast. *Nordberg Manufacturing Company*

FOR the second successive year, *Railway Engineering and Maintenance* presents, as part of its Equipment Economies number, the March of Machines, in which we review, briefly and graphically, many of the new and improved machines applicable to railway maintenance work that have become available during the past twelve months. We do this to give our readers an opportunity to refresh their minds regarding these many units of new equipment, all of which have been described in greater detail in the issues of April, 1947, to February, 1948, inclusive. Included are units for use in virtually every phase of railway maintenance.

During this period the number of new and improved machines becoming available has been equal to, if not greater than, the large number introduced during the previous year. Material shortages and manufacturing difficulties which, contrary to expecta-

(3) Left — Hydraulically-controlled earth drill capable of drilling holes from 6 in. to 42 in. in diameter and to depths up to 10 ft. Especially designed to facilitate transportation and operation. *The Buda Company*

(4) Below — One-man, high-cycle, electric chain saw. Is 38 in. in length and weighs 27 lb. Affords accurate cutting of timbers up to about 40 in. and may be operated at any angle. *The Homelite Corporation*

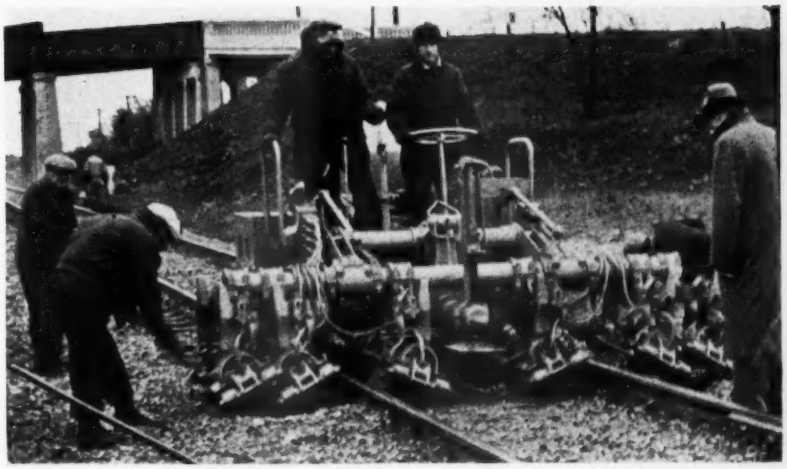
(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)

—A Review

tions, continued throughout the first full post-war year, 1946, were, undoubtedly, important factors in unloosing the veritable flood of machines that have been placed on the market during the past year. Whatever the cause may be, technological progress is again on the march in the railway maintenance field.

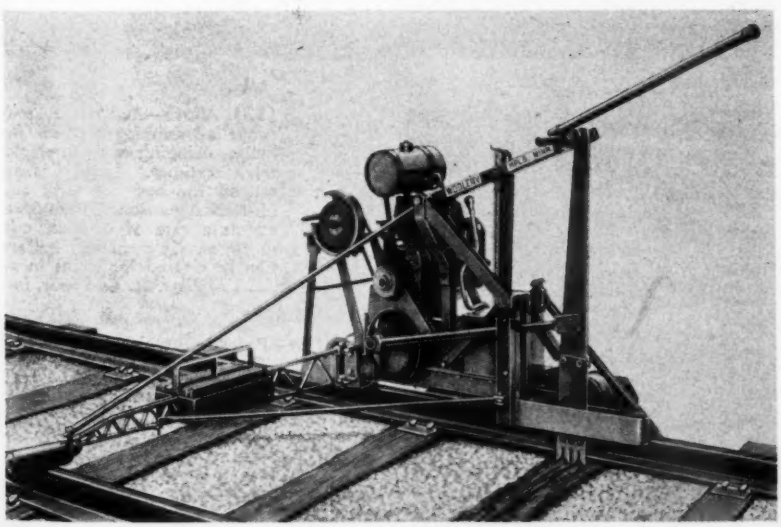
As further evidence that the manufacturers are continuing their efforts to fulfill the needs of the railways for new and better equipment, the reader need only glance at the Products of Manufacturers department of this issue, in which many additional labor-saving devices are described for the first time. The number of these new and improved devices, now available to railway purchasers, appears to be far greater than ever before.

In the interest of conservation of space and the readers' time the presentations are limited to photographs and brief captions. Also, because of space limitations, it has not been possible to present quite all of the many meritorious developments that were introduced during the past year.



(5) Above—Self-propelled multiple tamping machine operated by one man and equipped with 12 individual electric vibratory tampers. Tamping units are attached to transverse crosshead mounted on front of four-wheel carriage by cantilever arm. Known as the Jackson Multiple Tamper. For all kinds of ballast. *Electric Tamper & Equipment Co.*

(6) Right—Combination rail grinder, consisting of lightweight, two-cycle gasoline engine and flexible shaft and weighing 100 lb. The engine is mounted on the frame by means of a 360 deg. swivel base and operates up to 4500 r.p.m. Model No. 603. Also for off-track use. *Mall Tool Company*

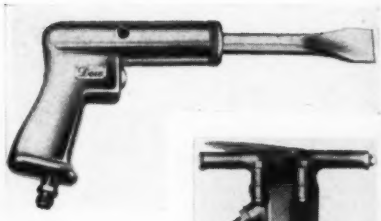


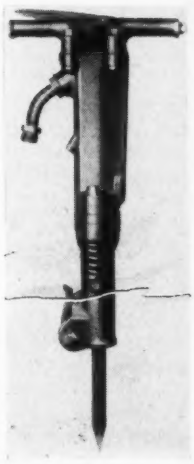
(7) Above—Improved tie-cutting machine. New model has self-centering wheels, improved friction slide, and folding lift handles. A removable spare-blade carrier facilitates lifting the unit from the rails. Average time per cut is 25 sec. *Woolery Machine Company*

(8) Below—Bridge jack with chain and bolt-puller attachment. Has capacity of 15 tons. Equipped with base-locking pawl which, when released, permits jack to be operated from any angle up to 30 deg. from the vertical. Model No. 310. *Templeton, Kenly & Co.*

(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)

March of Machines—

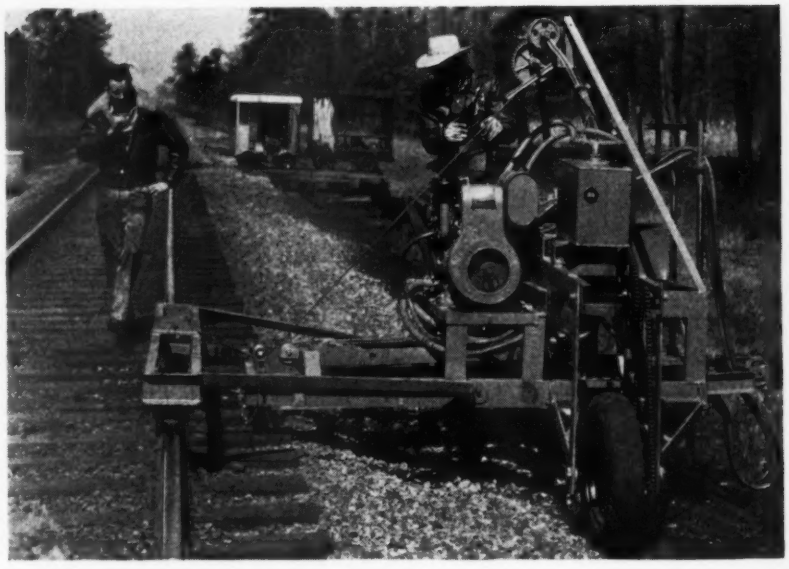




(10) Above—Air-lubricated, air-cooled pneumatic hammer. Has loose fitting piston. Said to require little lubrication. *Dow Pneumatic Tool Company*

(11) Right—Pneumatic paving breaker for heavy-duty demolition work. Metering device furnishes lubrication for working parts. *Ingersoll-Rand Co.*

(9) Above—Lightweight rail drill, 23½ in. long and weighing 43 lb., used with Mall power unit. Particularly adapted for working around switches. *Mall Tool Company*

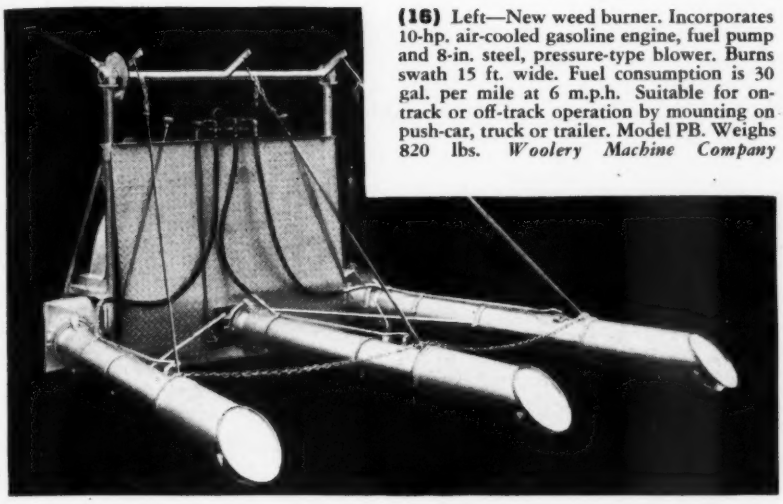


(12) Above—Portable roller designed for economical rolling of railroad crossings, platforms, shoulders, parking areas, driveways, and patchwork of all types. Rear roller provides a compaction of 145 lb. to 150 lb. per inch of roller; front roller a compaction of 40 lb. to 50 lb. per inch. Main roller is 24 in. wide and 32 in. in diameter: split-type front roller is 18 in. in diameter. Model 155. *Littleford Bros., Inc.*

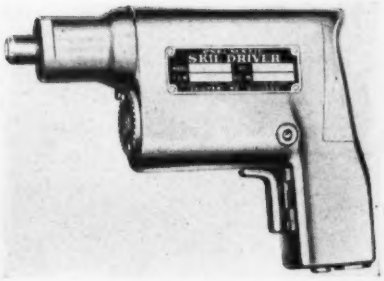
(13) Above—Auger-type, self-propelled cribbing machine for ballast-stripping work in single-track territory. Machine is arranged for both on-track and off-track operation. Said to operate at a rate of one-half crib in 30 sec. in cemented ballast. Can be cleared for trains in 30 sec. *The Kershaw Company, Inc.*

(14) Left—Portable, gas-driven arc-welder. The unit is 32 in. long, 26 in. wide, 28 in. high and weighs 315 lb. Equipped with two receptacles for emergency lighting cords, and rated at 150 amp. at 30 volts on a 50 per cent duty cycle. Its portability is said to permit normal operation with but 20 ft. of cable, resulting in minimum line loss. Stationary model also available. *The Hollup Corporation*

(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)



(16) Left—New weed burner. Incorporates 10-hp. air-cooled gasoline engine, fuel pump and 8-in. steel, pressure-type blower. Burns swath 15 ft. wide. Fuel consumption is 30 gal. per mile at 6 m.p.h. Suitable for on-track or off-track operation by mounting on push-car, truck or trailer. Model PB. Weighs 820 lbs. *Woolery Machine Company*



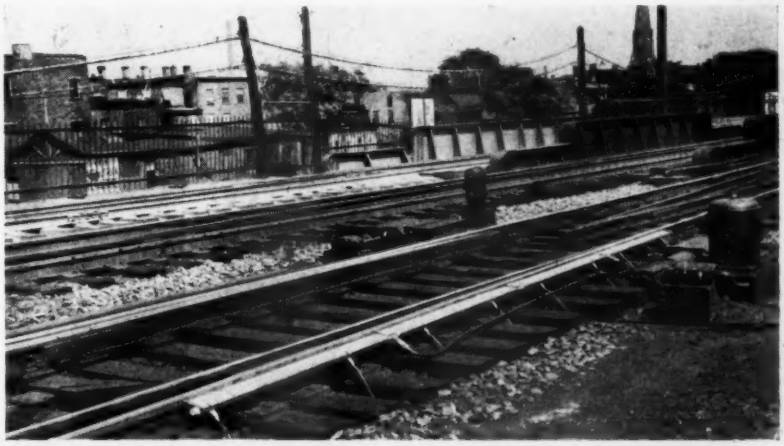
(15) Above—Pneumatic screw-driver. Compact and light, the tool features heat-treated, alloy-steel gears and shafts, and a rotor of advanced design. Is said to be capable of withstanding severe use. Available in three sizes with speeds of 800, 1300 and 2100 r.p.m. One of a line of 28 pneumatic tools of various types now produced by this manufacturer, including drills, nut-runners, and die grinders. *Skilsaw, Inc.*

(17) Above—Portable weed burner. Burns 2-ft. swath. Especially adapted for use in yards, along fence rows, for melting snow and ice at switches, and for thawing the bottoms of hopper cars. Weighs about 100 lb. Model AJX. *Woolery Machine Company*

(18) Right — Velocity Power Rail Punch. Uses explosive blank cartridge to drive a die through web of rail to "drill" holes for track bolts. Said to enable one man to punch 30 to 40 holes per hour. *Mine Safety Appliances Company*

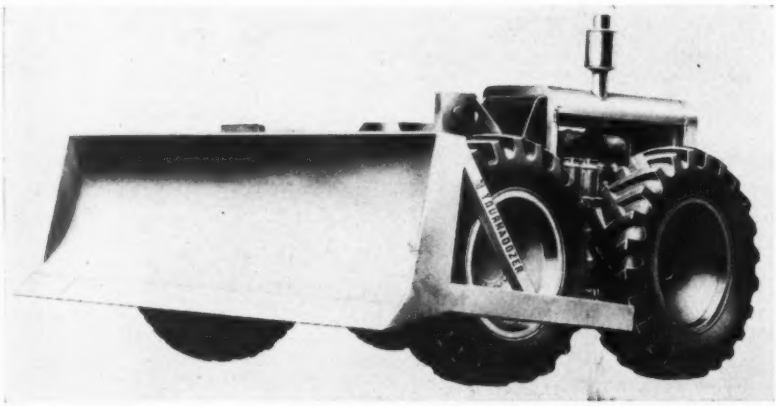
(20) Below—Switch heater. Designed for use with propane gas. Fuel consumption said to be 5 to 6 lb. of gas per hour, per switch. Gas may be supplied from central point through underground pipe lines or directly from tank at track side. Burner sections are 10 ft. long so that the number per switch can be varied to suit the length of switch. Known as "Rail-Tel." *The Rails Company*

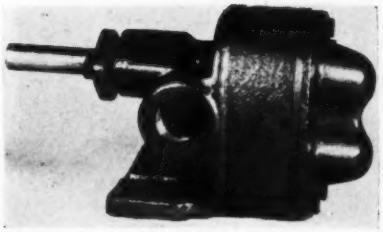
(19) Above—Adjustable saw track. Constructed of structural welded steel and designed for use with Stanley safety saws W7, W8 and W9 when making square, bevel, or bevel-mitre cuts. The new track is said to eliminate the necessity of laying out and working each piece of lumber, and thereby to effect substantial economies in cutting lumber to the exact size desired. Model No. 158. *The Stanley Works*



(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)

March of Machines—

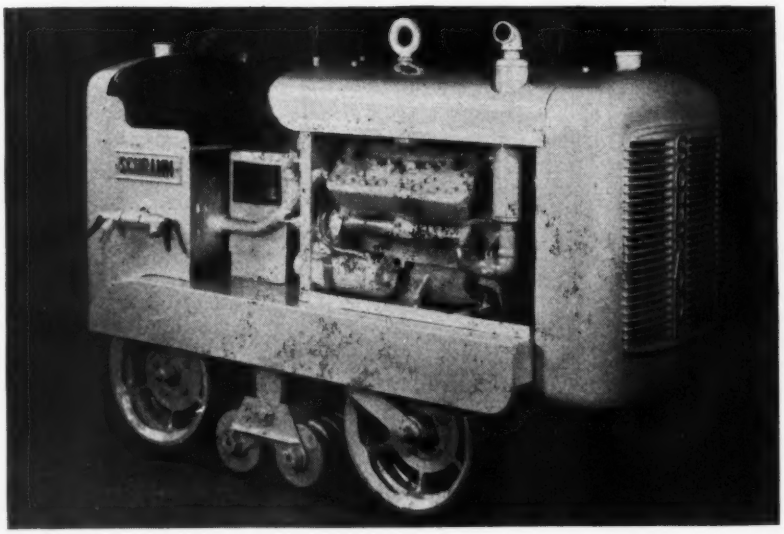




(21) Above — Rotary pumps suitable for handling fuel oil, Diesel oil and lubricating oil. Available in six sizes, with capacities up to 51 g.p.m. Known as 6A rotary pumps. *Worthington Pump & Machinery Corp.*

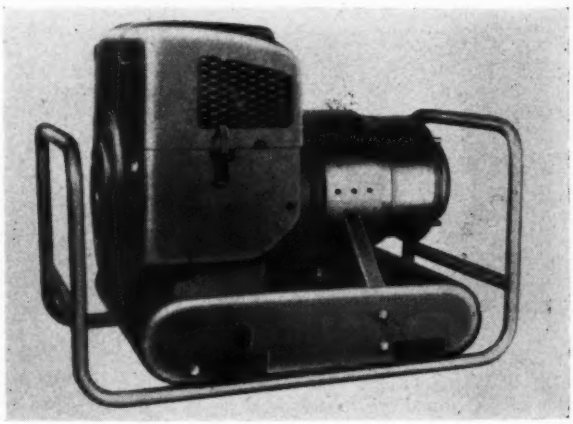
(22) Left — High-speed, pneumatic-tired Tournadozer. Capable of four speeds ranging up to 12 m.p.h. Mounted on four 14-by-32 taper-bead tires. *R. G. LeTourneau, Inc.*

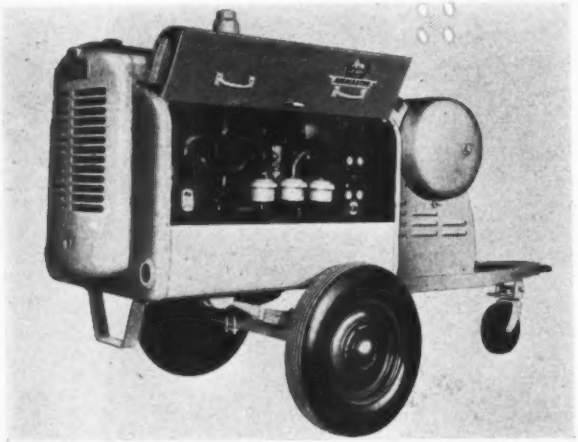
(23) Below—All-purpose, electric impact tool, weighing 6½ lb. and having an overall length of 10½ in. Operates on 110-volt a-c. or d-c. at a free speed of 2,000 r.p.m. Said to deliver 1,900 "rotary impacts" per minute when under load. *Ingersoll-Rand Company*



(24) Above—Crawler-mounted air compressor, 33 in. wide, 51 in. high and 88 in. long. Operates at speeds of 1 to 18 m.p.h. Adaptable for use with many types of air-operated tools. Accessories include a bulldozer attachment and a power take-off. *Schramm, Inc.*

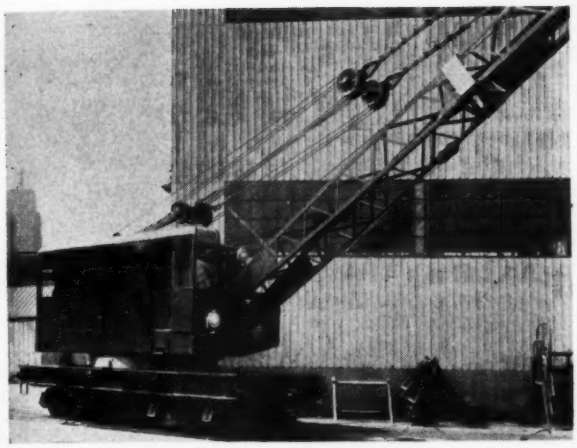
(25) Below—Portable air compressor with a capacity of 85 c.f.m. Powered by valve-in-head engine. Can be mounted on two pneumatic-tired wheels or on hardwood skids. Full-length tool boxes provided with each mounting. *The LeRoi Company*



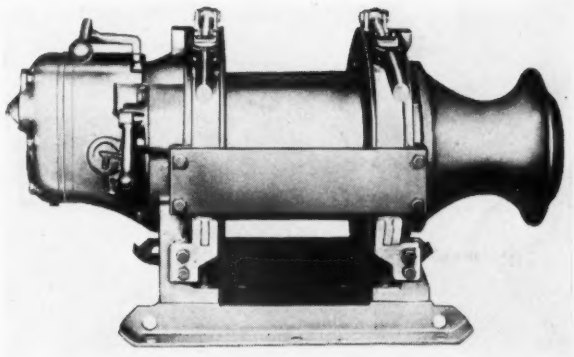


(26) Above—New 5,000-watt electric generator unit. Available in 60- or 50-cycle alternating-current models. Employs the Onan CK air-cooled, four-cycle, two-cylinder gasoline engine directly connected to self-excited generator with inherent voltage regulation. A 12-volt automotive-type battery furnishes starting power. Model 5CK-115M. Wt. 272 lb. *D. W. Onan & Sons, Inc.*

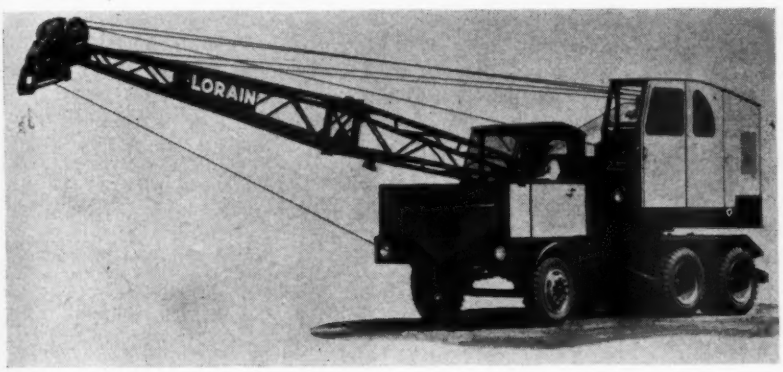
(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)



(27) Above—Diesel-electric locomotive crane. Has a rated capacity of 40 tons. Adapted for use with grab bucket, grapple and magnet in addition to general hook work. *American Hoist & Derrick Co.*

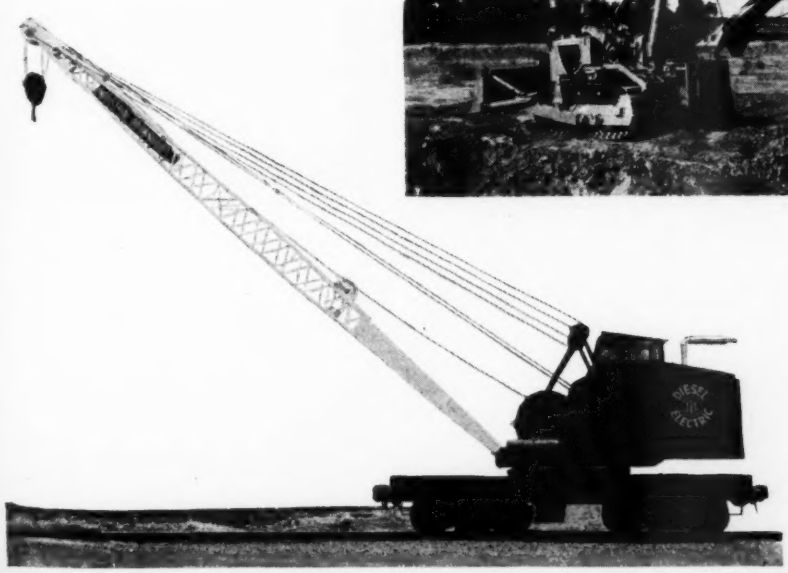


(28) Above—Utility winch, with air-motor, electric motor, or gasoline-engine drive. Said to handle loads up to one ton and as far away as 1,100 ft. The unit embodies a combination drum and cathead, with the power unit integral with the winch, located at one end opposite the cathead. Winch is controlled by two levers, a clutch lever, and a brake lever. *Chicago Pneumatic Tool Co.*



(29) Left—Dual control Moto-Crane capable of on-the-job travel at speeds up to 7 m.p.h., controlled from the crane-operator's cab. It is reported that only five minutes are required to convert a machine equipped with Dual control into a self-propelled unit, in which on-the-job travel, powered by the turntable engine, as well as steering, controlled by air power, may be governed by the operator from his position in the turntable cab. When work at one place has been completed, and it is desired to move the unit to another location as a highway-truck crane, the unit may be quickly reconverted to driver control in approximately five minutes. Over-the-road travel to the new location may be done at speeds ranging up to 33 m.p.h. *Thew Shovel Company*

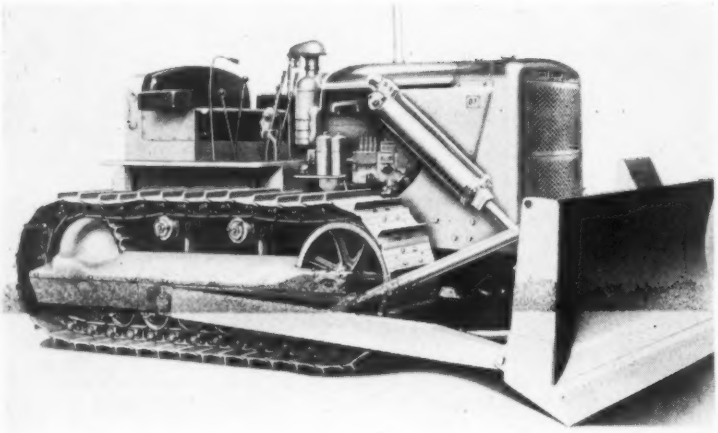
(30) Right—Combination dragline, clamshell and crane designed for installation on Caterpillar track-type tractors. With the unit mounted at the rear of the tractor, it is said utility bulldozing and full-track oscillation are available on a standard tractor. Reported to be able to operate in restricted locations. *The Hyster Company*

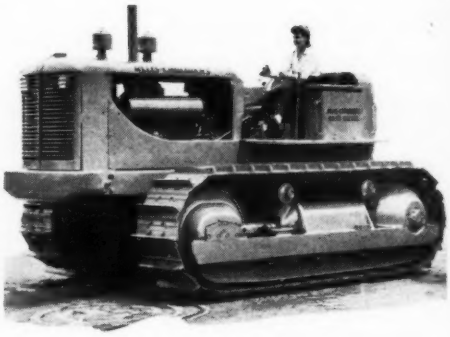


(31) Left—Diesel-electric locomotive crane, with capacities upwards from 30 tons and with travel speeds up to 15 m.p.h. The use of Diesel-electric power is said to permit power to be transmitted directly to the axles by means of inside-hung, spring-suspended motors, eliminating travel gears, shafting and clutches. An important design feature is said to be the patented monitor-type cab that affords the operator unrestricted 360 deg. visibility. The crane is available with electric power for revolving. Clearance of 14 in. is provided between the revolving cab and the body of the supporting car. *The Industrial Brownhoist Corp.*

(For additional information on any of the products described on this page, use post cards, page 231, indicating key numbers)

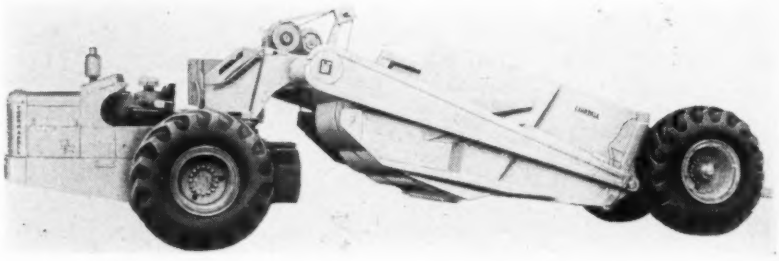
March of Machines—



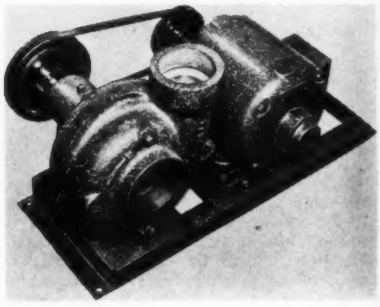


(33) Above—Heavy-duty crawler tractor. Has Torque Converter drive, a three-speed transmission, hydraulically-powered steering levers, a track tread of 84 in., and a wide, adjustable operator's seat. Running gear requires lubrication once in 1000 hr. Model HD-19. *Allis-Chalmers Mfg. Co.*

(32) Above—Hydraulic bulldozers available in four sizes and matched in capacity to the power of the several tractors for which they are designed. Have blades of both the straight and angling type and high operating visibility. *Caterpillar Tractor Company*

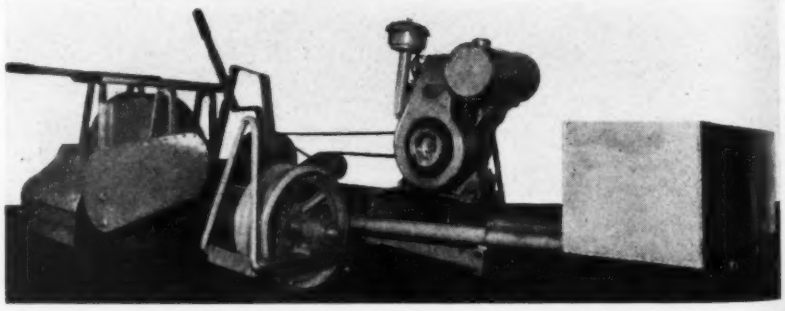


(34) Right—High-speed, electric-controlled Tournapull with capacity of 35 tons. Has four speeds forward and two in reverse and travels at speeds up to 15 m.p.h. For high production and maneuverability, Model B Tournapull. *R. G. LeTourneau, Inc.*



(35) Above — Pedestal-type centrifugal pump. Available in five sizes, with capacities up to 500 g.p.m. Designated as the "Pedrifugal" pump. *Allis-Chalmers Mfg. Co.*

(36) Left — New type Tractor-Shovel, mounted on Allis-Chalmers HD-5 tractor. Suited for work where shoveling and loading are required. *Tractomotive Corporation*



(37) Right—Cribbing machine for use in removing the ballast from cribs in the vicinity of the tie-plate areas during rail-laying operations. Designed for one-man operation, the machine is said to be capable of operating at the rate of one 39-ft. rail per minute. Powered by gasoline engine. The power unit is located in the opposite side of the two-wheeled carriage as an aid in balancing. Has many safety features. *The Thornley Railway Equipment Company*

(For additional information regarding any of the products described on this page, use post cards, page 231)

PRODUCTS OF MANUFACTURERS

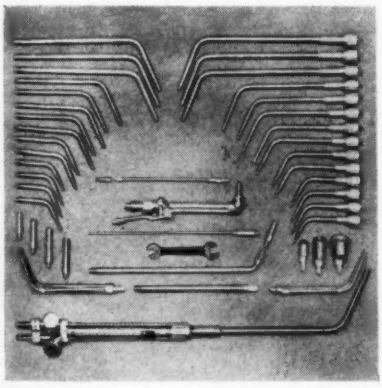
New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 231)

Welding Torches

THE Air Reduction Sales Company, New York, has announced the availability of a new oxyacetylene welding torch, designated as the Airco 800. Although the new torch has a conventional weight of 1½ lb. and is only 11½-in. long, it is reported to be suitable for almost any welding job because it has a capacity for operating single-flame welding tips from No. 0 to 13, inclusive, and multiflame tips up to No. 15.

The torch head of the new Airco 800 is made of Monel metal whose durable qualities are said to make possible a fewer number of head replacements, and also lower maintenance costs, since reseating is rarely, if ever, required. Complete welding tip assemblies are available in sizes 0 to 10. Each welding tip is assembled with an individual mixer drilled for that particular size tip, thus, it is said, assuring better control and results.



The Airco "800" Torch and the Tools That Can Be Used With It

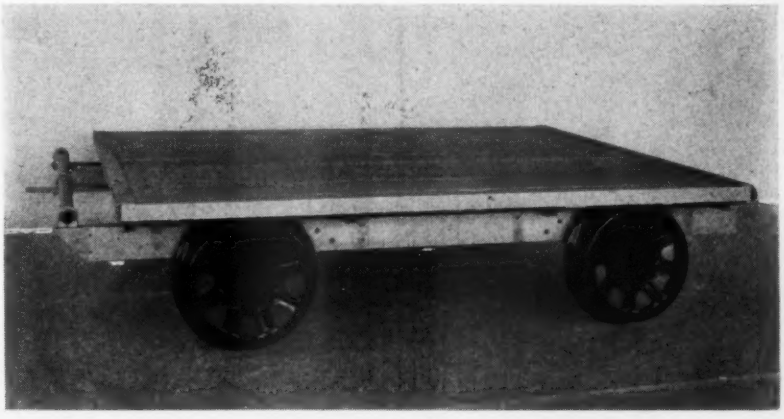
In addition to the "800", this manufacturer is also offering a smaller version known as the Airco 700. This torch is constructed along the same lines as the "800", and is reported to have the same advantages, including the complete welding-tip assemblies. Attachments that use Airco's present line of cutting tips are available.

The Fairmont MR19-A Inspection Car with Two-Way Drive

Inspection Car, Push Cars and Trailers

FAIRMONT Railway Motors, Inc., Fairmont, Minn., is now producing a new one-to-four-man inspection car, known as the MR19 Series A, and, in addition, is introducing a new and improved line of both lightweight and standard push cars and trailers.

The new motor car, outwardly similar to a standard car, has a two-way drive that permits the car to be driven either forward or backward without reversing the engine. The direction of travel is changed by releasing one belt lever, braking the car to a near stop, and then engaging the other belt lever. It is reported that the car need not be brought to a full stop before changing direction, and, since there are no sliding gears to be matched before shifting, accidental engagement of both levers at the same time will not harm the drive.



The Fairmont Standard Trailer Having a Capacity of 6000 Lb.

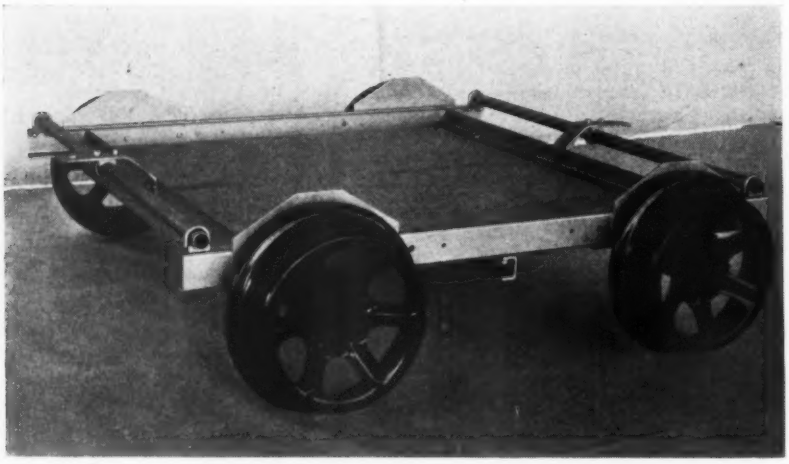
This car also has two speeds in either the forward or backward direction. The standard drive provides for the normal speed and pulling power, while the second speed is reported to give 30 per cent more pulling power with a corresponding reduction in top speed. The forward drive is a conventional direct-belt drive from engine to axle with an idler pulley. The reverse drive is also an endless cord belt drive with an idler pulley, but the final drive is through a set of enclosed gears mounted on the drive axle.

The Trailers

The new line of trailers consists of eight different models ranging in capacity from 1,000 lb. to 10,000 lb. Two models are in the lightweight class for use with inspection cars and lightweight section cars. Both models have aluminum alloy frames, tapered roller bearings and one differential axle. The smaller one, with a capacity of 1,000 lb., weighs 280 lb., while the larger one, of 2,000-lb. capacity, weighs 380 lb. Both models can be equipped with four-wheel brakes.

There are six models of standard trailers in three different axle sizes. Of the two in each axle size, one model has a white-oak frame and the other a structural-steel frame. These models have capacities ranging from 6,000 lb. to 10,000 lb. All of them have deck sides and deck ends reinforced with steel angles, four insulated 16-in. demountable wheels, one differential axle, and a steel-tubing lift pipe at each end.

Available as extras are full-length rail skids, detachable seat and steps, couplers, and four-wheel brakes with the brake-lever socket located under the edge of the deck to protect it when material is unloaded off the side of the trailer. The brake lever in each trailer is detachable and a carrier for the lever is located under the deck of the trailer.



This Lightweight Trailer Has a Capacity of 1000 Lb.

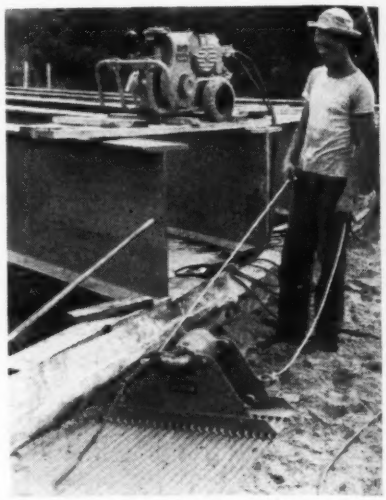
Soil Compactor

THE Electric Tamper & Equipment Co., Ludington, Mich., has developed a new machine, the Jackson Model L Soil Compactor, which is designed for use in compacting granular soils. It is a vibratory machine which operates on the principle that any type of granular soil, such as sand or gravel, when placed loose in fills will undergo settlement when subjected to vibration. The machine is used to compact sand or gravel backfills at bridges and culverts and to compact the sub-bases beneath shop floors and concrete paving.

Essentially the unit consists of a vibratory motor mounted in a metal frame. When used for compacting granular materials, the frame has a corrugated base. By substituting a smooth base, the machine can be used for compacting and smoothing asphalt-type paving mixtures at highway crossings and station platforms. When equipped with a specially-designed base, it is said that the compactor is effective in reducing the voids in coarse gravel and crushed rock.

The compactor is operated by a three-phase, 60-cycle, 110-volt induction motor of the squirrel-cage type. When in operation, it propels itself at a speed of 5 to 6 ft. per min., guided by the operator. With this unit, it is said that 10 to 15 sq. ft. of area may be compacted per minute to a depth of 12 in. The machine is portable, weighing 150 lb.

The power plant usually furnished to operate the compactor is the Electric Tamper & Equipment Co's. Model M-2, the same plant used to operate four tie tampers. It is capable of operating four Model L Soil Compactors simultaneously, and may also be used to operate power tools.



The Jackson Model L Vibratory Soil Compactor in Operation at a Bridge Backfill

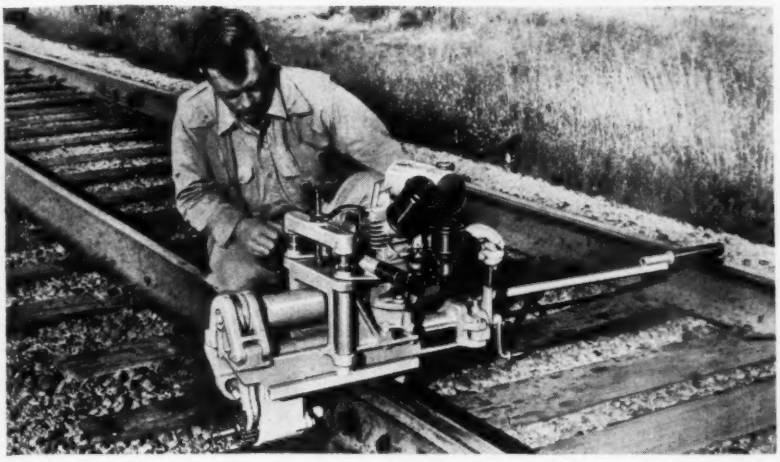
Nordberg Rail Drill

A NEW rail drill, designated as the Model CD, has been developed by the Nordberg Manufacturing Company, Milwaukee, Wis. The new drill has an aluminum frame and frictionless bearings, and is powered by a 1½-hp. air-cooled gasoline engine. When in operation no part of the machine rests on the ties, and a level position is maintained by a stabilizing bar which rests on the opposite rail. The entire unit weighs only 132 lb.

The drill bit is pawl driven and it is said that it cannot be fed beyond the capacity of the motor, thereby preventing undue strain on parts and bit. Overload release is accomplished by means of a spring and a flexible coupling which cause the pawls to be lifted from the chuck ratchet when the strain becomes excessive. The drill is fed by a hand ratchet incorporating a high-speed crank for moving the fork into the holding position against the rail and a ratchet-feed handle for controlling the speed of the bit.

The chuck for holding the bit consists of the halves of a tapered cylinder with a groove along the inside surfaces fitting the bead on either side of a flat drill bit. The chuck halves have four holes for insertion of a pin against which the end of the bit is butted. As the bit wears, the pin is

(For additional information regarding any of the products described on this page, use post cards, page 231)



The Nordberg Model CD Rail Drill in Operation

moved forward to the next hole.

Adjustment of the drill to the position of holes to be drilled is obtained by turning a wing nut, and locking in final position is accomplished by means of a lever. Because the Model CD rail drill has a wide spread between the drill bit and the holding fork, it can be used for drilling at heel blocks of switches and for drilling guard rails in place.

I-R Introducing 30-C.F.M. Compressor

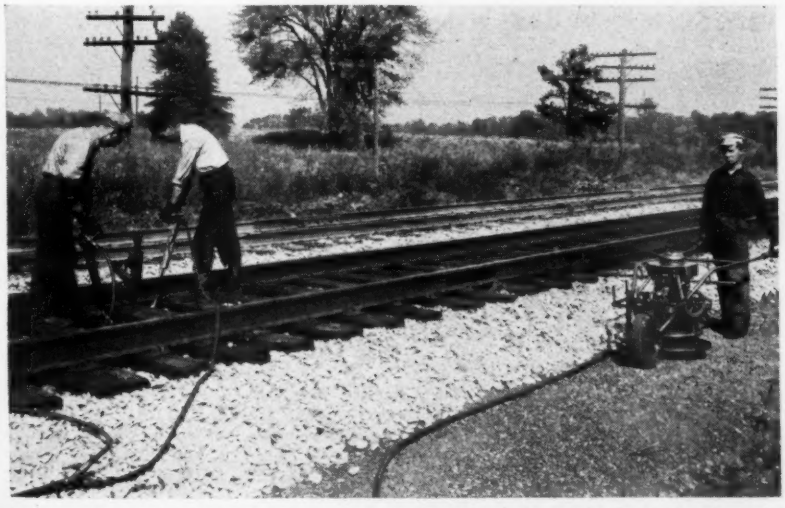
INGERSOLL - RAND Company, New York, announces that, after extensive service applications, including thorough tests on a number of roads throughout the country during the past year, it is now manufacturing for general distribution on the railroads a new small portable compressor known as the Spot-Air. Designated No. 3-R-30, this compressor is a compact unit, weighing only 200 lb., and is designed for a wide range of applications in track, bridge and building work. With a rated capacity of 30 c.f.m., the Spot-Air is capable of operating two tamping guns, and thus is designed essentially for section gang use in spot tamping work. However, used in multiple, it is equally adapted to extra-gang, out-of-face surfacing. At the same time, the new unit is suitable for operating other pneumatic tools employed in track work, such as tie-boring drills, and impact wrenches for tightening joint bolts and putting down lag screws, and has many applications in bridge and building work, including the operation of riveting, scaling and chipping tools, as well as of impact wrenches, power hand saws and paint spraying equipment.

The compressor is operated by a three-cylinder, four-cycle radial gasoline engine. The cylinders of the engine lie in a horizontal plane and are spaced at intervals of 120 deg. about a vertical crank shaft. Alternately spaced between the power cylinders, and in the same plane with them, are three compressor cylinders. The connecting rods of both the power and the compressor cylinders are connected to the crank shaft in an articulated arrangement with one master rod and five link rods, thus permitting the use of a single-throw crank shaft, supported by tapered roller bearings. The flywheel of the unit is of cast aluminum with fan blades instead of spokes for cooling the engine and compressor.

Showing the Spot-Air Compressor Being Used to Operate a Drill for Boring Ties

The engine and compressor are lubricated by a force-feed system, thereby eliminating the need of adding lubricants to the fuel. A patented feature permits the use of a single oil-bath air filter for both the power cylinders and the compressor cylinders. The exhaust manifold from the compressor cylinders serves as a combination manifold and aftercooler. The unit produces its rated 30 cu. ft. of air per minute at a working pressure of 80 p.s.i. The fuel tank has a capacity for two hours' continuous operation.

The Spot-Air is mounted on a circular steel plate 20 in. in diameter and its overall height is 27 in., thus permitting it to be placed in the intertrack space without interfering with traffic. It can be lifted readily by two men using a bar inserted through a collar in the frame of the machine, but a detachable wheelbarrow-type



Demonstrating How the Wheelbarrow Carrier Is Used to Move the Spot-Air Along the Roadbed Shoulder While the Tie-Tamping Work Continues Without Interruption

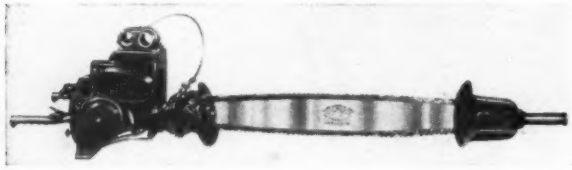
(For additional information regarding any of the products described on this page, use post cards, page 231)

carrier, with hooks to engage the lifting bar, may be obtained as an accessory. With this carrier, the unit may be moved from point to point, as required, by one man lifting only 40 lb. on the handles of the carrier. The compressor unit may be carried to and from work on the tool tray of a standard section car, or on a trailer.

Improved Chain Saw

TWO new features concentrated in the engine and tail stock assemblies have been incorporated in the chain saw manufactured by Henry Disston & Sons, Inc., Philadelphia, Pa. These features include an automatic chain lubricator and a simplified "cradle balanced" tail stock.

The chain lubricator on the engine has been designed to make the lubrication system of the chain entirely automatic and of sufficient pressure to prevent clogging of the line by saw dust and other foreign matter. It is said that the pump will operate in any position and that the flow is automatically shut off when the chain is not running.



The Disston Chain Saw with Automatic Chain Oiler and "Cradle Balanced" Tail Stock

The new pump is cam operated and is said to develop positive pressure with each turn of the sprocket. Easily refilled, the oil reservoir's capacity is reported to match that of the fuel tank so that, under ordinary operating conditions, the chain lubricating oil supply will last as long as a tank of fuel.

Any type of oil, even kerosene, may be used as the chain lubricant. Oil lines are said to be amply protected against damage in the new device, since it shuts off the flow automatically when the clutch is disengaged. It is fully interchangeable with equipment now in use.

The new tail stock is reported to be more compact, stronger and easier to handle, although it has been reduced in size, weighing two pounds less than the old tail stock. Since this new tail stock is said to be "cradle balanced" and shaped to fit into the operator's arm, the operator is able to use the body of the tail stock as a fulcrum for maneuvering the saw in the cut. It is detachable and can be removed if the saw gets stuck in the cut. A simplified tensioning device has been added, which is reported to have fewer parts, and to make possible variations in the tension of the chain through a wide range to suit the individual requirements of the operator or the job.

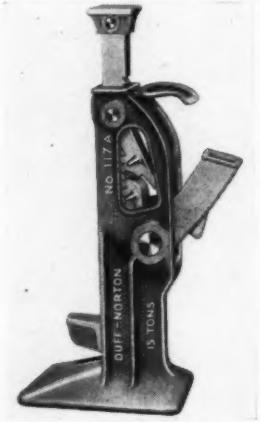
A higher safety factor in the use of the saw is said to have been achieved by the manner in which it is encased in the tail stock. Slots that exposed the operator's fingers to the cutting chain have been eliminated.

Three New Jacks

THE Duff-Norton Manufacturing Company, Pittsburgh, Pa., has added three new units to its line of jacks, including a lightweight track jack, a 25-ton capacity hydraulic journal jack, and an hydraulic jack for lifting work in close quarters, known as the new "Lo-Hite" jack.

The new track jack, known as Model 117-A, is identical with the Model 117, except that it has an aluminum-alloy base, with consequent reduction in the over-all weight of the jack. Because of its light weight (42 lb.) the new jack is said to provide easier and faster service in track-surfacing and lining operations. Danger of accidental tripping of the load is said to be eliminated by the Duff-Norton spring-actuated pawls.

The new light-weight, 25-ton capacity hydraulic journal jack is reported to weigh 25 per cent less than standard Duff-Norton models of the same capacity, yet is said to possess



The Duff-Norton Model 117-A Track Jack with Aluminum Housing

The New Duff-Norton Lightweight, 25-Ton Hydraulic Journal Jack Is Available in Two Models, One of Which Is Shown Here

the same power, strength and service life as the standard models. Two models of this jack are available, both having a capacity of 25 tons. The 25H 7.5 has a raise of 4 in., a closed height of 7½ in. and weighs 35 lb. The 25H 9.3 has a raise of 6 in., a closed height of 9⅜ in. and weighs 38 lb.

The new "Lo-Hite" hydraulic jack is fitted with an independent pump which is connected to the jacking mechanism by a length of rubber tubing. The pump can be operated from the ground or from any convenient place, when the jack itself is spotted in close, confined positions, otherwise impossible of access.

Oil in the "Lo-Hite" jack is sealed-in so that it is completely isolated from the jack exterior, thus permitting use of the jack in both vertical and horizontal positions. When not in use, the jack folds into a compact, easily-carried unit.

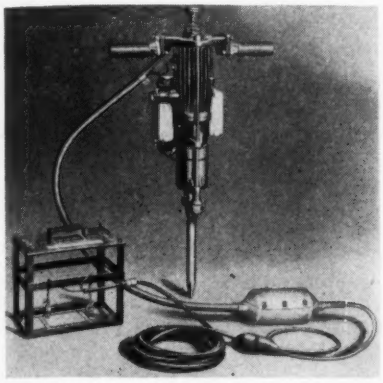
Gasoline Hammer

THE Barco Manufacturing Company, Chicago, has placed on the market a new gasoline hammer, the Model H-6B, which is said to be superior to its predecessor, the Model H-6, in both speed and power of operation without increase in weight or vibration.

The new hammer is a self-contained unit consisting, essentially, of a piston actuated by a gasoline-fired cylinder to deliver vibratory hammer blows. The unit contains a spark coil for ignition, connected by cable to a battery, a fuel tank, and a handle for one-man operation. The increased speed and power of the new hammer have been obtained, it is said, by using a new piston and spring combination.

(For additional information regarding any of the products described on this page, use post cards, page 231)

Another new feature is a cable connection at an angle under the handle instead of a straight connection into the end of the handle. This type of construction is said to prevent damage



The Model H-6B Barco Gasoline Hammer

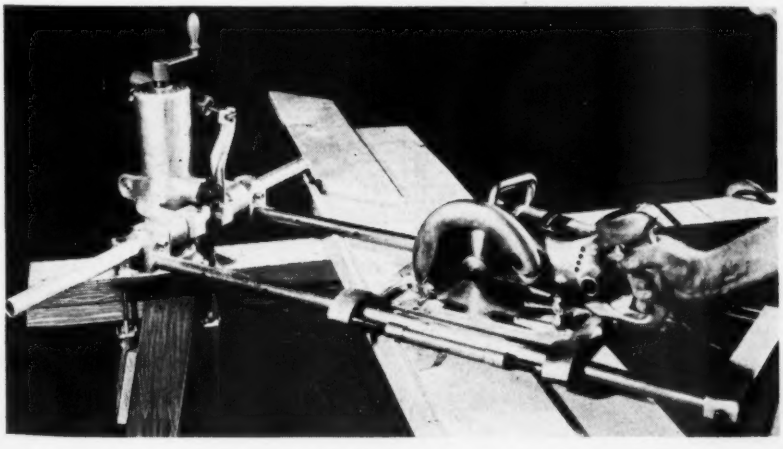
to the wiring caused by sharp bending of the cable. It also reduces the overall width of the hammer to the actual width of the handle, thus aiding operation in narrow openings. The hammer delivers 1,450 to 1,550 hammer blows per minute and weighs 94 lb. For ignition either a 6-volt wet battery or a 9-volt dry battery may be used as desired.

Arm for Portable Saws

THE Black & Decker Manufacturing Co., Towson, Md., has developed a device, known as the Quick-Saw Arm, which is reported to speed up many "on the job" sawing operations involving the use of this company's electric-operated hand saws. Briefly the device incorporates a column to which is fastened a cantilever arm, and a saw carriage which slides on the arm. The entire unit can be clamped to a carpenter's saw horse or mounted on a table. All Black & Decker portable electric saws fit into the saw carriage, which is adjustable for this purpose. Because it eliminates the necessity of picking up and laying down the saw for each cutting operation, this device is reported to increase production and to reduce operator fatigue.

Using a Quick-Saw arm, a saw can be adjusted for any of the following types of cuts: cross-cut, mitre, bevel, compound angle and ripping. All depth and angle adjustments of the saw itself can be made in the saw carriage. Adjustments for height, angle and balance are made on the column.

The maximum travel of the saw carriage on the cutting stroke is 20½ in., with the depth of cut ranging from 2¼ in. to 3 in., depending on the size of the saw. The angle of cut ranges from 0 deg. to 180 deg., and bevel cuts can be made up to 45 deg. The net weight of the Quick-Saw Arm (not including saw) is 42½ lb.



Illustrating How the Quick-Saw Arm Is Used for Mitre Cutting

Electronic Igniter for Gas Switch Heaters

THE Rails Company, New Haven, Conn., has recently developed an electronic remote-control apparatus for igniting, keeping lit, and turning off the gas or propane switch heaters manufactured by this company, which are known as "Rail-Tel" and "Gas-Trac" heaters. Ignition of the gas at the switch heater is obtained by means of spark plugs, one of which is attached to each burner section.

An Installation of a "Rail-Tel" Switch Heater, Equipped with an Electronic Igniter, at a Main-Line High-Speed Turnout. Four Conductors, Two on Each Side of the Track, Lead to Spark Plugs Directly Below Each Gas Connection

The electronic igniter embodies four or six automotive-type ignition coils, one for each burner section in the switch heater; a solenoid valve, for opening and closing the gas supply line; and an electronic timing device. These units are enclosed in a metal box which can be placed in a convenient location near the switch heater, such as an instrument house. A coaxial cable carries high voltage current from the ignition coils to the spark plugs. The spark plugs in each heating section are located immediately adjacent to the inspirator in such a manner that the spark gap is directly in the path of the gas mixture as it leaves the inspirator. As the spark occurs, the gas mixture becomes ignited. The unit operates on 110-volt or 220-volt alternating or direct current.

The igniter units are controlled by a switch which may be located at the nearest tower, telegraph operator's or

(For additional information regarding any of the products described on this page, use post cards, page 231)

dispatcher's office, regardless of its distance from the switch heater. Where the installation is to be made in C.T.C. territory, the switch may be located on the control panel of the C.T.C. machine. By closing the switch, a coded current is sent through a circuit provided in the C.T.C. line wires and actuates a relay in the instrument house adjacent to the switch. The relay turns the power supply into the igniter box, thus actuating the electronic circuit. The electronic circuit then opens the solenoid valve, turning the gas supply into the heaters, and causes the ignition coils to transmit current to the spark plugs at any desired interval. This sparking action continues until the control switch is turned off, thus insuring that the heaters will be re-lit should they blow out for any reason.

The electronic igniter is adaptable for use at larger installations where a number of switch heaters are in service. In this case, the timing device can be combined with a selector so that sparking takes place at each switch in turn until all switch heaters have been sparked.

Backfill Tamper

A NEW air-operated tamping tool for compacting material placed in fills, known as the LeRoi No. 11 Backfill Tamper, has been announced by the LeRoi Company, Milwaukee, Wis. The new tool incorporates several new features said to provide easier holding, faster tamping and longer service life. It is said to deliver an impact blow scientifically developed for proper compaction of fill materials.

The LeRoi No. 11 Backfill Tamper

Essentially the tool consists of an air cylinder with piston which operates the tamping butt; a throttle valve which connects to the air supply; and a length of air pipe between the cylinder and throttle valve which serves as a handle.

In this tool, the backhead, cylinder, piston and throttle lever are constructed of high-strength drop forgings. A new metal-foil packing is said to prevent the piston stem from scuffing. The wiper construction in the front bumper retainer is said to keep harmful foreign matter out of the machine. The valves are designed to prevent air leakage, thereby reducing the air consumption of the tool. When the tool is in operation, the new exhaust construction is said not only to prevent freezing but also to reduce noise. The tool is easy to assemble, disassemble and inspect, it is claimed. It has a 1½-in. bore, a 7-in. stroke, is 47½-in. long, overall, and weighs 34 lb.

New Buda Jacks

THE Buda Company, Harvey, Ill., has introduced two new models of light-weight lifting jacks, the Buda Model 225-A Klinch-Klaw Jack and the Buda Model 2510-A journal jack.

The Buda Klinch-Klaw Jack is a ratchet, trip-type jack especially designed for pulling all types of bolts and spikes on railroad trestles and bridge work. The Model 225-A is identical to its predecessor, the Model 115, except that it has an aluminum-alloy frame, with consequent reduction in weight. Because the rack bar of this jack can be lowered below the base of the jack, it can grasp and pull bolts located 20 in. below the resting surface of the jack. It is said that this jack can be used to pull bolts in narrow places between beams, underneath trestles, and from the sides of beams. It can also be used for leveling track and general lifting purposes.

The inside of the claw of the jack is ribbed and slightly tapered. By using a tapered pin wedge, it will tightly grip headless bolts and rods. For pulling out headed bolts and spikes, a bolt-puller attachment is used with the claw. Its capacity is 15 tons.

The Model 2510-A Journal Jack has an aluminum alloy shell for light weight, and is said to be ideal for working in small areas, confined spaces, and where heights are limited. Due to a safety retarding spring in this jack, all creeping and accidental lowering of the load are said to be prevented. For this reason it is said that these jacks can be used to support structural columns during construction and for shoring work. For accurate control of the load they have a free-acting, ball-bearing screw action which enables them to raise a load any desired amount, however small, within the limits of the rise of the jacks. The Model 2510-A jack has a capacity of 25 tons and weighs 28 lb. Its closed height is 10 in. and it can lift a load 5½ in.

The Buda Model 225-A Klinch-Klaw Jack Pulling a Bolt

The Buda Model 2510-A Journal Jack

Woolery Weed Burner

THE Woolery Machine Company, Minneapolis, Minn., has announced a new off-track weed burner, designated as the Model PB-3T, which consists of a burner unit mounted on a rubber-tired trailer.

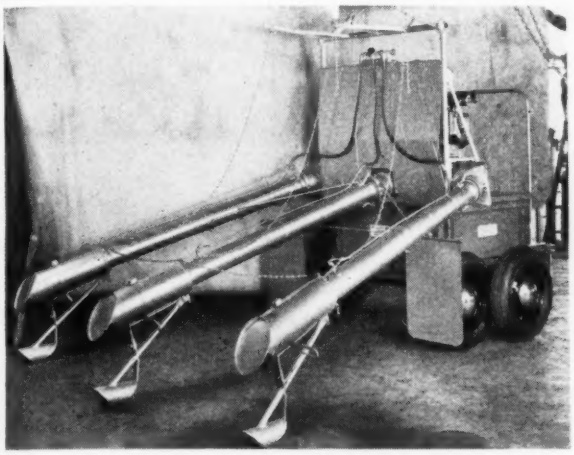
The burner unit is powered by a 2-cylinder, 10-hp., 4-cycle gasoline engine. A steel pressure blower with multiple V-belt drive supplies the air for the burners. Each of the three burner pipes is fitted with a skid at the burner head to maintain the proper distance between the burner head and the ground when the lift chains are slacked. The burner pipes can be lifted in unison by a hydraulic cylinder which is operated from the same pressure pump which supplies the fuel for the burners. The burners can be used together or individually, as desired. When the three burners are in operation, they can all be turned off quick-

(For additional information regarding any of the products described on this page, use post cards, page 231)

ly by a lever-action master valve.

The trailer is equipped with dual-tandem wheels to facilitate traveling over uneven terrain. The four tires are 6.00 by 16 in size, and a heat shield is provided to protect them. The trailer has torsion-spring axles and Timken bearing hubs. Built into the trailer is a 170-gal. fuel tank.

The unit can be towed by any light tractor, or if desired, the burner unit can be removed from the trailer and used on a push car or other vehicle.



The Woolery Model PB-3T Weed Burner

Weed Sprayer

A NEW self-propelled unit for the application of liquid weed killers to railway roadbeds has been developed by Fairmont Railway Motors, Inc., Fairmont, Minn. It is designated as the W66 Series A and is suitable for use with any free flowing liquid weed killing agent having little or no corrosive action on common metals.

The unit has a coil spring suspension with direct acting, railroad type hydraulic shock absorbers. All steps and walks are heavy expanded metal to give safe footing. The cab is fully enclosed with rubber-mounted safety glass windows, and has floor and wall ventilators, and one door on each side. It also has windshield wipers, two headlights, two twin air horns and red, green and white marker lights at each end.

The propelling engine is a six-cylinder, four-cycle gasoline engine of 112 hp. at 2,500 r.p.m. A hydraulic coupling is located between the engine and standard clutch, and the unit has a four-speed transmission and needle bearing propeller shaft. The enclosed reverse gear on the drive axle permits the four transmission speeds to be used in driving in either direction. The engine will drive the unit at a deadheading speed of 40 m.p.h.

Air brakes are of the clasp type operating on machined drums outside the wheels and have one power cylinder for each axle. This brake system also includes an emergency air tank and automatic valve to set the brakes in the event of an air-line failure.

A four-cylinder engine in the rear enclosure drives the gear-type loading and pressure pumps through a clutch, reduction gear and V-belts. This engine is controlled from inside the cab.

Two automatic reels carry two 50-ft. extension hoses for reaching weed patches along the right of way and around the ends of trestles. Pump intake lines have two sumps and two strainers, and are so arranged that air pressure can be used to blow out the strainers.

The machine is equipped with two sizes of spray nozzles arranged in tandem with five pairs in the center section and three pairs in each wing. Air-actuated valves operated from the cab are used to control the flow of liquid to the different nozzle groups.

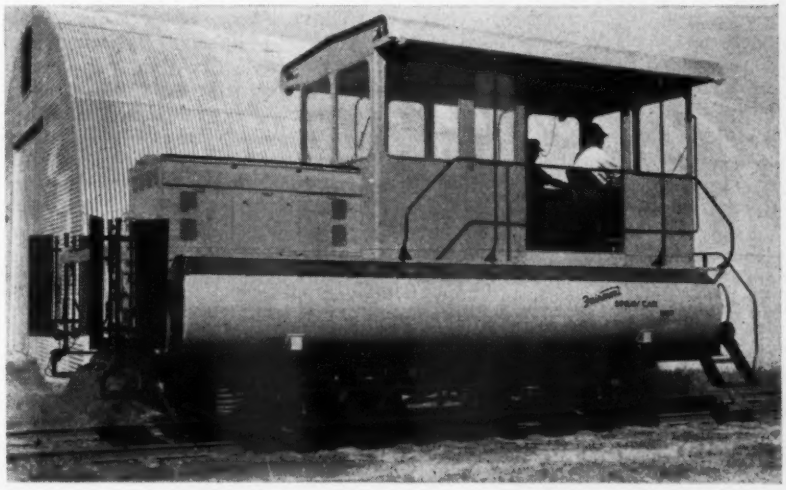
The quantity of liquid sprayed is dependent upon the track speed, the pressure and the nozzles used. At 16.8 m.p.h., a pressure of 100 lb., and using both sets of nozzles, the quantity sprayed per mile is 100 gal. By changing speed, nozzles and pressure it is reported that almost any rate of application can be obtained. The capacity of the tank is 2,600 gal., and, where conditions require a greater capacity, a trailer unit is available which holds an additional 3,000 gal.

Unit Tie Tamper

THE Racine Tool & Machine Co., Racine, Wis., has announced a new self-contained tie tamper which is claimed to be light in weight, easy to start, and simple to service. The new tool, known as the Racine Unit Tie Tamper, is powered by a 1¼-hp., single-cylinder, two-cycle, air-cooled magneto-ignition gasoline engine.

Incorporated in the tamper is a hammer principal involving a novel spring and crank assembly which is said to develop a high-velocity hammer blow. A sling-shot-like action of the hammer is obtained by using springs as the connecting means instead of a direct connecting rod between the hammer and crankshaft. Approximately 1,500 hammer blows per minute are imparted to the tamping tool. The spring-driving principal used is said to eliminate transmission of shock to the crankshaft, engine and operator.

The machine is started through magneto ignition by a cable-type, self-winding starter. Gas fumes are said to be exhausted from the engine with-



The Fairmont Model W66 Series A Weed Spray Car

(For additional information regarding any of the products described on this page, use post cards, page 231)

out entering the operating mechanism or contaminating the lubrication of the machine.

The machine has a nose piece designed to permit oscillation of the

The Racine Unit Tie Tamper

tamping bar. This motion of the tool creates a stirring action that is combined with the hammer blow. It has a six-position tool holder, in which can be mounted various tools in any position. The tools can be quickly removed by loosening two cap screws on the tool holder. Including a regulation 20-in. tamping tool, this tamper is said to weigh just over 50 lb.

Improved Weed Killer

FOLLOWING tests covering a total of 209 mi. of track on three roads during 1947, the Weed Killer department of General Chemical division, Allied Chemical & Dye Corporation, is introducing into the railroad field, in conjunction with its long-established application service, an improved weed killer, known as General Chemical Weed Killer—Formula No. 7. This new weed destroyer is harmless to man and animals, but is said to be toxic to the extent of complete kill to practically all noxious vegetation which commonly infests the roadbed and track structure, including Bermuda, Johnson, kedge, bunch and cyperus spur grasses, and such weeds as horse-nettles, iron weed, dogbane, mildweed, trumpet vine and others.

Formula No. 7 is a compound of very low volatile petroleum aromatic oils containing polychloracetyl constituents equivalent to not less than 5 per cent trichloracetic acid, plus 10 per cent acid arsenical supplement 7A. Mixed with water in the proportion of 1 to 3, the resulting solution is sprayed on the vegetation at the rate of 6 to 10 gal. of concentrate per mile strip of track or roadway 1 ft. wide. Normally, the lighter dosage is used within the tie area, while the heavier is applied to the ballast shoulder and towpath. The killing action of the chemical involves both the contact and translocating principles of attack—the former breaking up the surfaces of the plant and the latter passing the chemical down into the root structures.

Application of Formula No. 7 is made by the Weed Killer department of General Chemical with its own chemical spraying equipment, which is generally operated over the track at the rate of 12 m.p.h. As operated, the equipment employs three tank cars (one for water, one for Formula No. 7 and one for supplement 7A) and a special spray car. The two chemical concentrates are transferred by air pressure to the spray car where they are automatically and continuously mixed with water from the water car through a triple proportioning unit. From this unit, which provides for readily changing the proportion or quantity of mix according to the character or amount of weed growth encountered, the liquid is sprayed on the track and shoulder, as desired, through a series of spray nozzles arranged beneath the forward end of the spray car.

Applying Formula No. 7 to a Heavy Growth of Noxious Grasses by Means of the Company's Spraying Equipment

One of the most conclusive tests with the new formula was conducted in the Everglades area of Florida, with its lush growth of southern perennial grasses, including Bermuda grass, giant Para grass and maiden cane 6 to 14 ft. high. Here, in spite of the unusually wet conditions that existed as the result of the September, 1947, hurricane and high water in the area, investigation six weeks after treatment is said to have disclosed highly effective results, all ordinary weeds and grasses having been killed outright, including their root systems. Even Bermuda grass, in all stages of density and height, is said to have been killed 100 per cent.

Two woody vines—wild grape and gopher apple—with enormous root systems extending inside and outside the rails, were said to have been completely top killed, and to a depth of 2 to 8 in. below the surface, but did show some tendency to resprout from below after six weeks. The same condition, it is said, was found with respect to the patches of Johnson grass treated, but in all cases the infestation, it is claimed, was reduced in size, vigor and density. That the kill of these particular plants was not more effective is attributed to the intensly saturated soil conditions at the time of the chemical application.

Diesel-Electric Plants

D. W. ONAN & Sons, Inc., Minneapolis, Minn., has developed a new line of Diesel-electric plants designed to provide low-cost electric power under continuous operating conditions on either mobile or stationary jobs. Two general types of these plants are available, one type being operated by a water-cooled Diesel engine, and the other powered by an air-cooled Diesel engine.

The Onan water-cooled Diesel-electric plan is enclosed in a weatherproof, sheet-steel housing with removable side panels for easy servicing, and has a welded base of heavy structural steel. It has a heavy-duty "Lanova" full Diesel engine with large capacity copper-and-brass radiator, and a six-blade, belt-driven pusher fan. A welded steel battery-and-accessory rack contains two, six-volt starting batter-

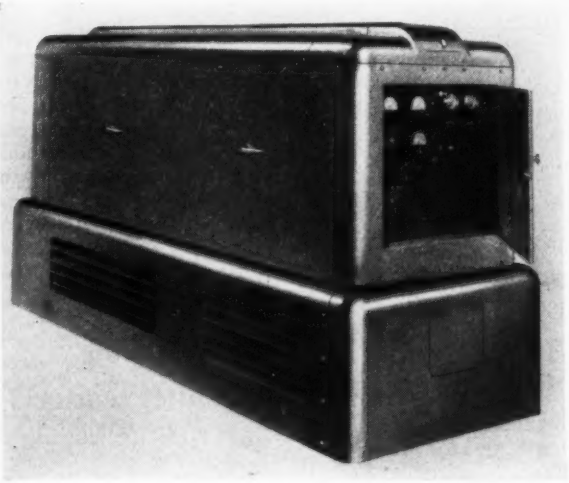
(For additional information regarding any of the products described on this page, use post cards, page 231)

ies which are kept fully charged by a 12-volt, belt-driven generator.

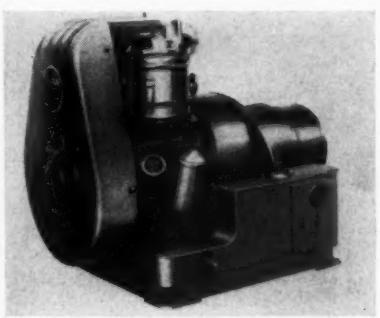
The plant has an Onan saturated-field generator which is said to have good voltage regulation without the use of rheostats or other external electrical equipment. If extremely close regulation is needed, however, automatic voltage regulators can be supplied.

The engine instrument panel is built-in, as is the electric instrument panel, eliminating the need for a separate switchboard, and the panels are illuminated by a 12-volt pilot light. All alternating-current models have a running-time meter.

Either 50 or 60-cycle alternating-current models of the water-cooled Diesel-electric plant are available in capacities ranging from 10,000 to 35,000 watts, with voltages ranging from 115 to 380. Direct-current models of the water-cooled plant can be supplied in 10,000 and 15,000-watt capacities with voltages of 115 and 230.



Left—The Onan Water-Cooled Diesel - Electric Plant



The Onan Air-Cooled Diesel-Electric Plant

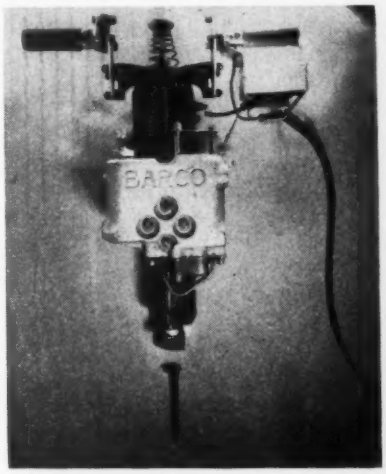
The Onan air-cooled Diesel-electric plant is said to be unusually compact and light in weight. The application of air-cooling to the Diesel is claimed to simplify servicing and reduce maintenance costs.

The Diesel engine in this plant is a one-cylinder, four-cycle unit. Electric cranking of the engine is made possible by a specially-designed automatic compression release. Starting controls are located at the plant, and additional starting controls can be installed at stations within 250 ft. of the unit. This plant also, has the Onan saturated-field generator. All engine and generator controls required for operating the plant are located on the steel base. The plant has a built-in fuel tank. The air-cooled Diesel-electric plants are available in either alternating or direct-current models of 2,500-watt capacities, with voltages of 115 to 230.

Barco Spike Driver

THE Barco Manufacturing Company, Chicago, has announced a new gasoline spike driver which has been developed from this company's H-6B concrete breaker. Essentially the H-6B concrete breaker consists of a piston and spring combination actuated by a gasoline-powered cylinder to deliver 1,450 to 1,550 hammer blows per minute. Ignition is accomplished by a spark coil connected by cable to a battery. The fuel tank is mounted on the unit. At the top of the unit there are two hand grips permitting one-man operation.

The new Barco spike driver is similar in appearance and construction to the H-6B concrete breaker, since most of the main parts of the concrete breaker were used for the spike driver. The principal difference is that, on the spike driver, the coil is located on the handle, and there is only one low-tension wire between the coil and battery instead of the low and high-tension wires used in the concrete breaker. This wire is usually of such length that the operator may drive spikes for a distance of 50 to 100 ft. before it becomes necessary to move the battery to a new location.



The Barco Gasoline Spike Driver

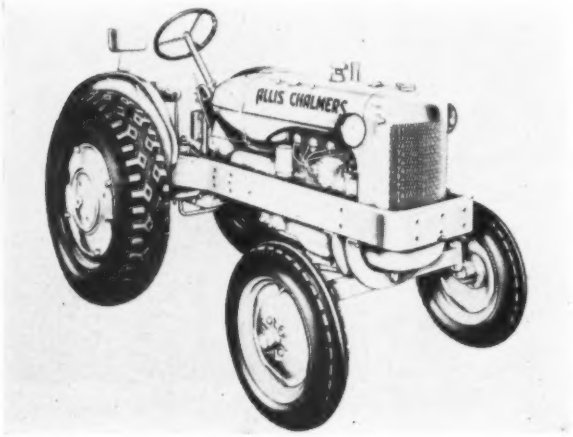
In addition to driving conventional spikes in open track, the new spike driver is adapted for driving spikes at crossovers and other locations where the space is limited, and for driving anchor spikes. The Barco Gasoline Spike Driver is particularly valuable for driving spikes in yards, terminals and other locations where traffic is heavy, since the use of this machine does not tie up the track.

Driving a Spike with the Barco Gasoline Spike Driver

(For additional information regarding any of the products described on this page, use post cards, page 231)

Wheel Tractor

THE Allis-Chalmers Manufacturing Company, Tractor Division, Milwaukee, Wis., has announced its new 1948 model IB Wheel Tractor, designed to provide mechanized service for all seasons of the year. It is said to provide for easy mounting of a wide assortment of tools useful in railway maintenance work.



The Allis-Chalmers IB Wheel Tractor

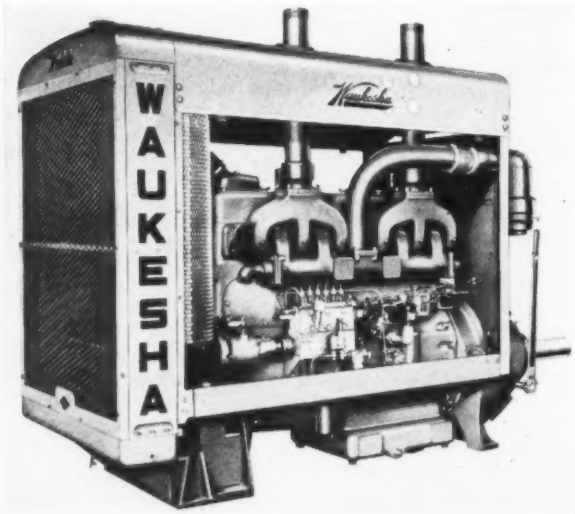
The tractor is powered by a 16.3-hp., water-cooled, four-cycle gasoline engine which is said to consume less than a gallon of fuel per hour on average work. It has a wheel base of 57 7/16 in., a length of 97½ in. and a ground clearance under the front axle of 8¾ in.

Waukesha Power Units

WAUKESHA Motor Company, Waukesha, Wis., is now offering two heavy-duty Diesel power units, designated as Models 6-WAKDU and 190-DLBU. The Model 6-WAKDU is the larger unit, being rated at 190 hp. at 1300 r.p.m. and is constructed around the Waukesha Model 6-WAKD Diesel engine. This engine is a 6-cyl. unit with a displacement of 1197 cu. in. and is cooled by a large-capacity, gear-driven centrifugal water pump.

Quick warm-up and maintenance of uniform jacket heat are assisted by thermostats. Lubrication of the engine is by means of an outside-mounted, gear-type pump which forces oil through large drilled passages to each point requiring lubrication. The power unit is mounted on a foot-type, flywheel housing with welded steel front supports. An instrument panel contains operating controls and an oil pressure gage, and the unit is also equipped with high-water-temperature and low-oil-pressure cut-off switches. The housing is of pressed steel with removable side panels.

The power take-off in the Model 6-WAKDU is of the heavy-duty clutch-type with a 3 15/16-in. by 10-in. shaft. The unit is started by means of an independent four-cylinder, Waukesha Model ICK gasoline-starting engine. Change over to Diesel operation is by means of a manual pinion shift with over-running clutch.



One of the Waukesha Model 6-WAKDU Diesel power units

The Model 190-DLBU power unit is somewhat smaller and utilizes the Waukesha Model 190-DLA Diesel engine. This unit develops 52.6 hp. at 1800 r.p.m. The engine is cooled by a combination belt-driven fan and water pump and has thermostatic controls for quick warm-up. Lubrication is pressure fed and is of the metered intermittent jet-and-spray type. The mounting, housing and instrument panel are similar to those of the Model 6-WAKDU. However, in this unit, the clutch-type power take-off, the oil-pressure and water-temperature protective devices and an electric starting motor are accessories, available at extra cost.

Tongs for Handling Ties and Other Timbers

TO FACILITATE the handling of ties and timbers the Mack Welding Company, Duluth, Minn., is introducing into the railroad field the Mack Log and Tie Tongs, and the Mack Pulpwood Grapples.

The Mack Log and Tie Tongs for Handling Ties, Bridge Timbers and Piling

Two types of the log and tie tongs are available, the standard log tongs, particularly adapted for handling (with a power crane) the longer timbers such as telephone poles, piling and bridge timbers; and the railroad-tie tongs, for handling ties. The log tongs weigh 2,290 lb. and have a 6-ft. opening between the jaws, which are 5½ ft. in width. The tie tongs weigh 1,850 lb., and have a 6-ft. opening between the jaws which are 3 ft. wide. The tie tongs have an approximate capacity of 14 ties.

The Mack Pulpwood Grapples, although originally designed for handling pulpwood with a power crane, are said to be applicable also for handling railroad ties. When ties only

(For additional information regarding any of the products described on this page, use post cards, page 231)

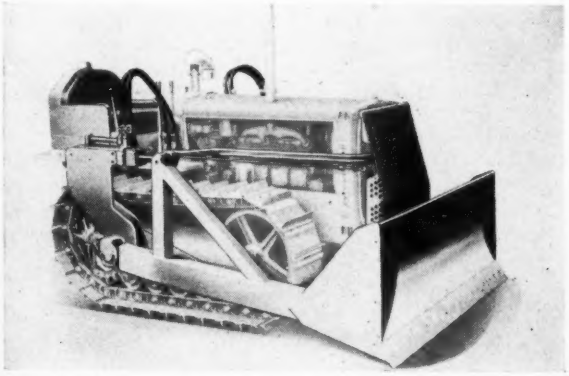
are to be handled, the manufacturer recommends the use of this device rather than the log and tie tongs because it is reported to have a greater

The Mack Pulpwood Grapples, Now Offered for Handling Ties

capacity in comparison with the weight. Ties must, however, be loaded into an open car if the Pulpwood Grapples are used. They are manufactured in three standard sizes, with the opening between jaws ranging from 5½ ft. to 8 ft. The widths of the jaws range from 2 ft. 6 in to 3 ft. 4 in., and the weight varies from 1,480 lb. to 2,830 lb.

Small Bulldozers

TWO new hydraudically-controlled bulldozers, designed for use with the manufacturer's smallest crawler-type tractor, the Caterpillar Diesel D2,



The "Caterpillar" Diesel D2 Tractor with No. 2S Hydraulic Bulldozer

have been announced by the Caterpillar Tractor Company, Peoria, Ill. These small bulldozers—No. 2A with an angling blade, and No. 2S with a straight blade, are said to be effective for many railroad off-track maintenance and construction jobs, such as snow removal and refuse handling, backfilling at bridges and culverts and earth moving in "tight" places.

The new units are said to have the advantages of a highly-efficient closed hydraulic system, with front-mounted, positive action, balanced vane-type pump, integral with tank and operating valves; a manually-operated control valve with "raise", "lower" and "hold" positions; carburized pins for connecting pistons, cranks and push arms; high-pressure, reinforced hydraulic hose; and seamless steel lines coupled to the hydraulic hose to direct oil flow from the hydraulic pump housing to the power cylinders.

The No. 2A bulldozer has a blade length of 80 in. for the 40-in. gage D2 tractor and 97½ in. for the 50-in. gage tractor. It has a maximum lift, with blade straight, of 28 in. When the blade is angled but not tilted, the lift at the leading point of the blade is 32½ in. for the 40-in. gage unit and 34 in. for the 50-in. gage tractor. It has an 11-in. drop below the ground, a blade angle of 25 deg. and a maximum tilting adjustment of 6 in.

The No. 2S bulldozer, offered also for both the 40-in. gage and the 50-in. gage D2 tractors, has a blade length of 68 in. for the former and 80 in. for the latter. It has a maximum lift of 25 in. and a drop below the ground level of 10 in.

Hopper-Car Unloading Team

TWO new units designed to facilitate the unloading of coal, stone, sand, gravel and other bulky materials have been developed by the Barber-Greene Company, Aurora, Ill. One of these units is a heavy-duty car unloader with a handling capacity said to range up to three tons per minute, while the other is a stockpiler-loader.

The Barber-Greene Model 358 Car Unloader

The unloader, designated as Model 358, is designed for operating in unloading pits or above the rails, directly beneath a car, as desired. Of rugged construction, it is mounted on a pair of pneumatic-tired wheels to facilitate moving it into position or for transportation over the highway. This unit is said to be balanced to the extent that one man can handle the machine to spot it at the proper location under a car or in a track pit. It may be obtained with an electric motor or a gasoline engine, as desired. A noteworthy feature of the unloader is its conveyor belt, which is actuated by a chain drive.

The chain and belt are riveted together by steel attachments and cleats, an arrangement which the manufacturer claims gives positive belt movement at all times without jamming.

The stockpiler-loader, designated as Model 363, is also available for electric or gasoline power and is mounted on two pneumatic-tired wheels. The unit may be obtained with a plain or a cleated belt as desired, the belt being operated through a chain drive. The stockpiler has a belt width of 24 in. and is available in lengths of 25 ft., 30 ft., and 35 ft.

The Barber-Greene Model 363 Stockpiler-Loader

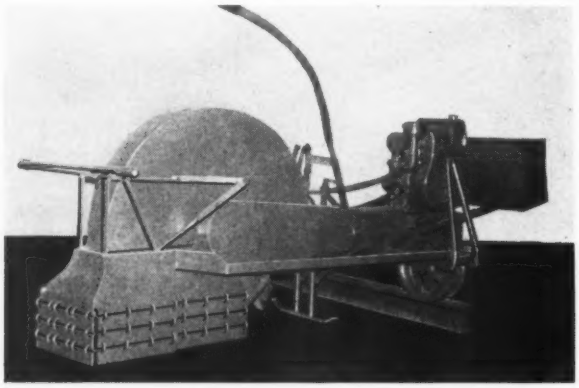
Thornley Cribber

THE Thornley Railway Machine Company, Joliet, Ill., is now offering the Model E Thornley Cribbing Machine, which has a number of improvements as compared with earlier models of this unit.

This is a wheel-type cribbing machine designed for operation on one rail. The principal improvement has been in the cribbing wheel, which has been increased from 32 in. to 48 in. in diameter. Other changes include the provision of a larger engine, and the adoption of a new design for the wheels that support the unit. These wheels are of the double-flange type and, in the new model, are constructed so that the outside flange is held clear of the rail-head bond wires at all times.

As in earlier models, the cribbing wheel and its drive mechanism are totally enclosed, and the base of the cribbing wheel is enclosed in flexible steel guards to prevent the operator from being struck by loose pieces of ballast. Also, the new model is equipped with a telescoping balance arm.

wings, two on each side, which are used to distribute, regulate and shape the ballast along the slope. These wings are also provided with scarifying teeth that re-work the ballast slope, removing all vegetation and breaking any crust formed around the tie ends. The machine is powered by a heavy-duty, 100-hp. motor, driving four wheels through a four-speed reversing transmission.



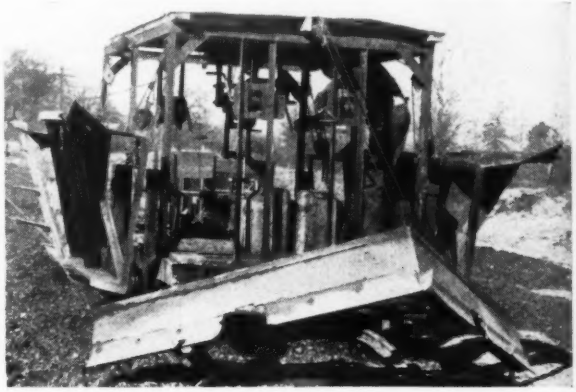
Left—The Model E Thornley Cribbing Machine

Ballast Plow

THE Kershaw Company, Inc., Montgomery, Ala., has announced the Kershaw Mule Ballast Plow and Track Dresser, a self-propelled unit which can be operated by two men, and which can be removed from the track by the two operators by means of a turntable provided for that purpose.

The unit is equipped with a plow which is used to remove the excess ballast from the center of the track, placing it on the shoulders where it is uniformly distributed and regulated along the tie ends. By adjusting the plow, the center ballast may be uniformly distributed in the center of the track.

The machine has four dressing



Right — The Kershaw Mule Ballast Plow and Track Dresser

Improved Mole

THE Railway Maintenance Corporation, Pittsburgh, Pa., has announced the development of an improved Mole incorporating changes in design which are reported to give the machine a digging and cleaning capacity approximately 25 per cent greater than previous models. Most of the parts of the new machine are said to be stronger and more easily accessible for maintenance and repairs. The power of the unit has been increased by 30 per cent, and an electric starting motor has been provided.

Another feature of the improved Mole is the application of an entirely new hydraulic drive for the rear swing dirt conveyor. Since this permits the swing conveyor to operate at any angle, it can be swung to clear roadside obstructions while still in operation, and for this reason the swing conveyor can now be made in any desired length.

Also drive gears such as were used in the previous models have been eliminated in the new machine, thereby, it is said, reducing the repair costs and increasing the efficiency of the screw conveyor.

Truck-Mounted Air Compressors

TWO new mobile air-compressor units applicable for use in railway maintenance and construction work have been developed by the Davey Compressor Company, Kent, Ohio. One of these units is the Davey Auto-

One of the Improved Moles in Operation

(For additional information on any of the products described on this page, use postcards, page 231)

Air compressor mounted on a Dodge Power Wagon, while the other is a truck-mounted Auto-Air compressor-winch assembly.

In the unit involving the Dodge Power Wagon with the Auto-Air compressor, the compressor occupies approximately one-third of the truck body space, leaving the remainder available for the transportation of men, tools and materials. It is driven direct from the truck motor through a heavy-duty power take-off.

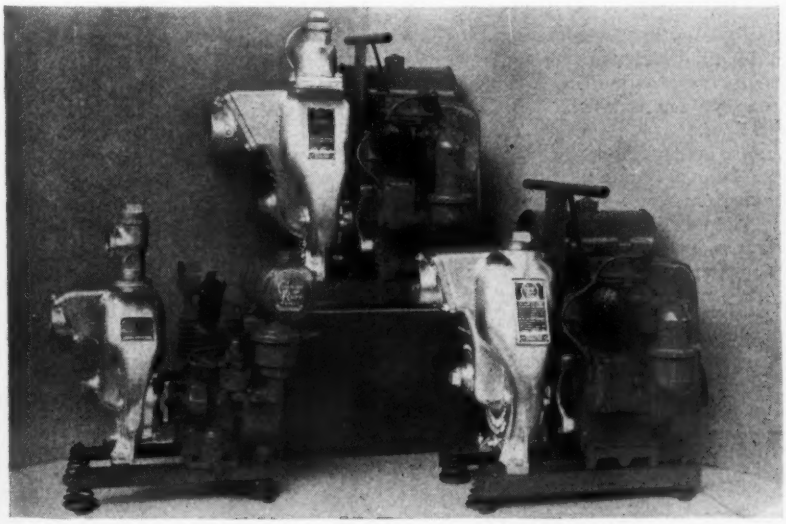
The Davey Auto-Air Compressor Mounted on a Dodge Power Wagon

In the new truck-mounted Auto-Air compressor-winch assembly, power for the operation of both compressor and winch is transmitted from the truck engine by a heavy-duty power take-off. A countershaft with two individual twin-disc clutches provides for either simultaneous or separate operation of the compressor and winch. The compressor is a standard Davey Model 105-vc Auto-Air, which delivers 105 c.f.m. at 100 lb. pressure. The winch which is mounted in the truck body has a capacity of 25,000 lb.

The air receiver and double-hose reels are mounted beneath the truck platform, thus effecting substantial space savings. The unit itself extends 40 in. behind the truck cab, leaving space for the transportation of men, tools and materials, and stands 38-in. above the bed of the truck.

New Lightweight Pumps

THE Gorman-Rupp Company, Mansfield, Ohio, has developed a new line of lightweight, general utility pumps incorporating a number of improvements which are reported to results from the application of an improved priming principal. These improvements are said to include faster automatic priming, priming at higher suction lifts, higher pressures and capacities, and higher efficiencies. Of three Gorman-Rupp lightweight pumps to which the improved priming principal has been applied, one is known as the Midget, another as the Hawk, and the other as the Eagle.



The Gorman-Rupp Midget, Hawk and Eagle Lightweight Pumps

The Midget 1½-in. pump, powered by either a Lawson or a Briggs & Stratton 1½-hp. air-cooled engine, has a maximum capacity of 86 g.p.m. at a 30-ft. head, a maximum lift of 30 ft., and weighs 62 lb. It has a priming time of 1 min. 15 sec. at a 25-ft. suction lift.

The Hawk 2-in. pump is powered by a 2.8-hp. Wisconsin air-cooled engine, and has a maximum capacity of 156 g.p.m. at a 30-ft. head, a maximum lift of 30 ft., a weight of 110 lb., and has a priming time of 47 sec. at a 25-ft. suction lift.

The Eagle 3-in. pump, powered by a 5-hp. Wilson air-cooled engine, has a maximum capacity of 280 gal. per min. at a 30-ft. head, a maximum lift of 30-ft. weighs 117 lb., and has a priming time of 1 min. 19 sec. at a 25-ft. suction lift. The maximum lifts and priming times are based on performances at sea level.

Equalizing Sling; Magnet Chain Assembly

THE S. G. Taylor Chain Company, Hammond, Ind., is now offering an equalizing sling, for use in handling loads of odd sizes and shapes, and a new chain assembly for use in lifting large electro-magnets.

The equalizing sling is known as the TM Level-Lift sling and embodies an equalizing unit and a continuous sling chain with an alloy steel hook on each end. The sling chain is passed over an hexagonal pulley in the equalizing unit, thus forming two legs of a sling, which can be adjusted in length according to the shape of the load or the distribution of its weight.

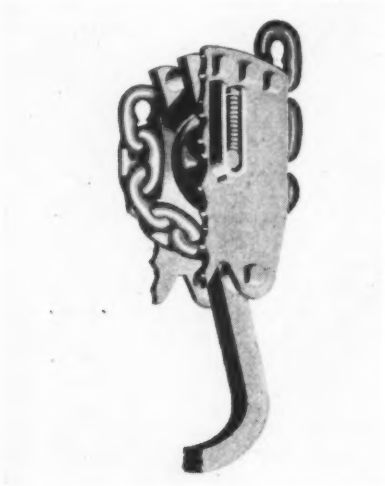
The hexagonal pulley in the equalizing unit is mounted on a shaft which is supported by coil springs at either end. As the loads are raised, these springs are compressed, permitting the pulley to be drawn downward into a pair of beveled brake shoes. The brake shoes lock the pulley against rotation. When the lift is lowered to the ground, the pressure on the spring is released and the pulley again becomes free to revolve. The TM Level-Lifts are made in five sizes with capacities ranging from 4 to 40 tons.

The magnet chain assembly, which is known as the TM Triple Magnet Chain, embodies a lifting ring to which are attached three leg chains, each of which contains three connecting links and a hook for attaching the

(For additional information regarding any of the products described on this page, use post cards, page 231)

legs to the lifting pins of the magnet.

Two of the three links in each leg are given a 60-deg. twist which serves to keep the links of the legs perpendicular to one another. This feature is said to prevent kinking and gouging, thereby reducing wear from these causes. A special alloy steel, used in the chains, is reported as having a high tensile strength and high resistance to shock, grain growth and work hardness, eliminating the need for periodical heat treatment.



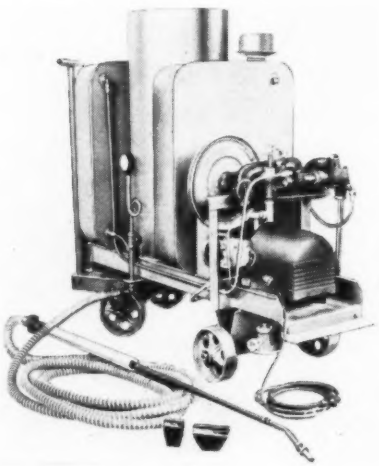
A Cut-Away View of the TM Level-Lift Equalizing Sling, Showing the Arrangement of the Hexagon Pulley, the Supporting Springs and the Brake Shoes

The TM Triple Magnet Chain Assembly

Steam-Cleaning Unit

THE Homestead Valve Manufacturing Company, Coraopolis, Pa., has introduced a "utility" model of its Hy-pressure Jenny steam cleaner which is recommended for cleaning applications involving mechanical equipment, as well as the floors, walls, windows and exteriors of buildings. It is a portable unit, available with either an oil or a natural-gas burner, and can be used at any location where an ordinary electric lighting circuit and a service cold water supply are available.

The machine operates at 80 to 120-lb. pressure and uses 90 gal. of water per hour. It is said to feature instant starting (ready to clean in less than a minute); simplicity of design and operation; welded unit construction; complete accessibility of all working parts; continuous electric spark ignition; non-clogging heating coil; and either a pressure-atomizing oil burner or a blower-type gas burner. It is equipped with 25 ft. of flexible steam hose and a cleaning gun with a round nozzle and with 2-in. and 4-in. flat nozzles. The mechanism is driven by a 110/220-volt, 60-cycle, continuous-duty electric motor.



The Hy-pressure Jenny Steam Cleaner

Additional equipment available includes a valve on the cleaning gun for nozzle control, rubber-tired wheels, trailers, extra guns and nozzles, Zeolite water softener and special motors for odd voltages and cycles. Also, if desired, the unit can be furnished equipped with a gasoline engine drive.

Tie-Boring Bit

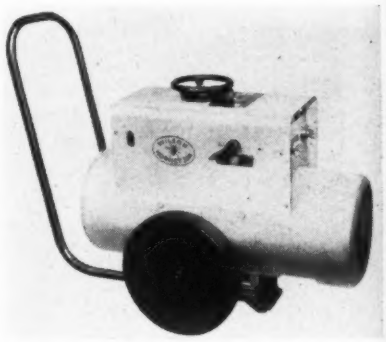
A NEW tie-boring bit which, it is claimed, can be easily repointed by an unskilled worker, has been announced by the Celfor Tool Division, Clark Equipment Company, Buchanan, Mich. Among the advantages listed for the new tool are fast drilling with minimum pressure by the worker, the ability to withstand abuse, and ease of repointing after the point has struck a rock, spike or plate. The new Celfor bit is available with three types of shank.

The New Celfor Tie-Boring Bit Showing the Three Types of Shanks Available

Heavy-Duty Welding Machine

THE Wilson Welder & Metals Co., Inc., New York, has announced the availability of a new heavy-duty, motor-generator arc-welding machine. Known as the Hornet 36A, the new unit is available in 200, 300, and 400-amp. models, each of which is mounted on a portable two-wheel carriage. The machines are designed for use with 220-volt or 440-volt current without requiring a change in relays or additional wires for voltage reconnection. Controls are said to be simple and can be adjusted easily and set accurately.

The Hornet arc welder is said to be designed to furnish smooth and steady current for all types of industrial welding.

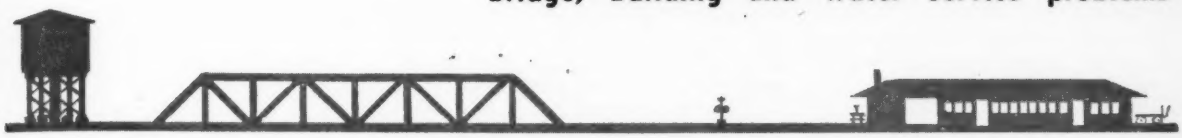


The Hornet Model 36A Motor Generator Arc Welding Machine

(For additional information on any of the products described on this page, use postcards, page 231, indicating key numbers)

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Making Runoffs for Track Raises

When raising track, what rate of runoff should be provided for the passage of trains? When closing the work for the day? What factors are involved?

Speed Usually Governs

By R. W. PUTNAM
Assistant Engineer Maintenance of Way and Structures, Southern Pacific, San Francisco, Cal.

The speed at which trains are permitted to operate over the territory covered by track-raising operations governs the temporary rate of runoff to be used. However, regardless of how slow the speed might be, the change in grade must not be so abrupt as to permit the cars to become uncoupled or to cause their couplings to be damaged.

Present demands for on-time performance of trains require that the track forces provide long runoffs to eliminate or at least minimize speed restrictions wherever possible. When the raise being given the track is very slight, it is possible to dispense with the slow order entirely. In general, however, it is advisable to issue slow orders during the working hours both as protection for workers and to preclude unsatisfactory riding of trains. For example, in making a two-inch surfacing raise, the work can be done safely without positive flag protection if a slow order of about 30 m.p.h. is placed and the forces are organized to tamp a rail-length runoff when signals, or other designated warnings, indicate the approach of a train. When the track is raised more than two inches, the work should be done under positive flag protection, but every effort made to eliminate the necessity for stopping trains. This can be done by keeping in close contact with the dispatcher so that the runoff can be tamped in sufficient time to permit the flagman to be called in before the arrival of a train.

Comfortable riding at 30 m.p.h. is ordinarily provided by a runoff about two rails long for a four-inch raise. Except for very high raises, such as those over six inches, a runoff should be tamped long enough to permit removal of the slow order. With a four-inch raise this over-night runoff should be at least three rails long. However, on the higher raises the cost of providing a runoff long enough to permit regular speed (especially in high-speed territory) is too great, and it is more practical, therefore, to reduce the speed to 30 or 40 m.p.h. and provide a runoff suitable for this speed.

For making temporary runoffs during working hours it is sufficient, ordinarily, to tamp the ties only outside the rail. But when the work is closed for the day, the tamping of the runoff should be complete in every detail, just as though it were to be permanent. Further, it must always be remembered that the correct elevation must be carried on curves, regardless of the length of the runoff if accident is to be avoided.

Best to Use Slow Orders

By C. C. VAN STRATTEN
Roadmaster, Missouri Pacific, Jefferson City, Mo.

The rate of runoff when raising track depends on the speed at which trains run over the section of track being raised. During the working hours the track to be raised should be covered by a restrictive speed order. The maximum speed stipulated in the order should be that speed which is most suitable to the height of the raise.

If the track is to be raised six or eight inches, the speed permitted should not be more than 20 m.p.h. This is based on the belief that for a speed of 10 m.p.h. the rate of runoff should not be more than one inch in 10 ft., and not more than one inch in 25 ft. for a speed of 20 m.p.h.

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In the May Issue

1. *When raising track should the foreman sight toward track that has been tamped, or away from it? How do these procedures differ? What are their relative advantages?*
2. *What methods can be used to control vermin in camp cars which are in service? Should the same methods be used when the cars are out of service? What insecticides or fumigants are most effective? What precautions are necessary?*
3. *In roadbed grouting operations, what are the various materials that can be added to the grout to improve its flow and penetrating characteristics? What are their relative advantages?*
4. *Where should brushed-on preservatives be used in connection with the construction or repair of treated or untreated timber trestles or other structures? What preservatives are most suitable for these purposes?*
5. *What are the various types of grinders for removing the cold-rolled lips on frogs, switch points and stock rails? For which type of work is each best adapted? Why?*
6. *How serious is the formation of silica scale in boilers? What are its disadvantages? What recent methods have been developed for its control? Explain.*
7. *What are the advantages of flame-hardening open-hearth frogs? How and where should this work be done? Are special precautions necessary?*
8. *What are the various types of doors available for enginehouses? What are their relative advantages from the standpoint of serviceability and maintenance?*

While the amount and kind of traffic are important factors to be considered when setting the maximum speed for a slow order, it must be remembered that under an order of 40 m.p.h., which would require a minimum runoff rate of one inch in 45 ft., the surfacing gang would spend a major part of the working day tamping runoffs, especially on busy tracks. However, where a raise of only 2 or 2½ in. is made, the length of time to make a runoff is not so great and the track can be worked safely with an order of 25 or 30 m.p.h.

When closing the work for the day the runoff should be made to comply with the maximum speed at which traffic will pass over that section of track during the time the track is not being worked. The most suitable rates for this purpose are:

1 in. in 105 ft. for 90 m.p.h.
1 in. in 95 ft. for 80 m.p.h.
1 in. in 80 ft. for 70 m.p.h.
1 in. in 70 ft. for 60 m.p.h.
1 in. in 60 ft. for 50 m.p.h.

Every runoff, regardless of its rate or the speed for which it is made, must be of exact cross level to provide the least disturbance to trains.

Line Important on Runoffs

By W. H. Sparks
General Inspector Track (Retired), Chesapeake & Ohio, Russell, Ky.

The class of trains and the speed at which they operate are not the same on all railroads. Consequently, the instructions that are issued to track forces as to the proper conduct of their work while raising track vary on different roads. Some railroads will not permit slow orders to be issued for the convenience of the track forces. Others allow speed restrictions wherever there are good causes.

When managements set up extensive track repair programs, and expect them completed safely, they must recognize that there is good cause for slow orders to be issued where track raising is in progress. While slow orders do retard the movements of trains to some extent, adequate planning by transportation officers in cooperation with their maintenance-of-way associates can reduce these delays to the minimum. This cooperation is immediately available when it is realized that the more the track forces can accomplish during the working season, the better the railroad will ride for everyone.

If the track where raising is in progress is covered by a slow order, the rate of runoff need only be 1 to 1½ in. to each 39-ft. rail for raises up to two inches. On the other hand, if no speed restrictions are allowed, the runoff rate can only be ½ in. to each 39-ft. rail. This will require twice as much time to prepare to avoid discomfort to passengers.

One of the things that must be done in making all runoffs safe, regardless of the speed of trains or the rate of the runoff, is to see that all ties are full-spiked to the standards of good track, and that good alinement exists throughout the length of runoff. At the end of the day, not only should the runoff be well lined and spiked, but every tie must be tamped solidly.

No Place For Carelessness

By R. L. Baucom
Research Department, Missouri Pacific, St. Louis, Mo.

The first consideration which should be given in making a runoff is that of providing a safe and comfortable passage for trains at the maximum permissible speed. Without constant realization of this fact, a foreman can easily get careless, allow his men to tamp the jack ties hurriedly and let a train over a temporary runoff which is entirely inadequate, perhaps causing a serious accident with unnecessary loss of life and damage to property.

The factors involved in making a runoff are train speeds and the height the track is raised, which together determine the rate and length of runoff. Under ordinary conditions a practical length of runoff permissible for each inch of raise ranges from 25 ft. at 20 m.p.h. and 60 ft. at 50 m.p.h. to 105 ft. at 90 m.p.h. If it is thought that adherence to these standards requires too many man-hours at the end of the day to restore normal speed to the track, the only alternative is to keep a slow order in effect after work-hours. Such a procedure will undoubtedly be economical where the track raise is quite high and the scheduled speed of trains is in excess of 50 m.p.h.

Lessening Skylight Condensation

What measures can be taken to prevent or minimize condensation and dripping from skylights? Does the design of the skylight or the type of glass used make any difference? Why?

Gutters Reduce Damage

By O. G. Wilbur
Assistant to Engineer of Buildings, Baltimore & Ohio, Baltimore, Md.

Properly-designed skylight construction provides for small formed gutters as a part of the skylight frames. Condensation forming on the metal bars which make up the frames drips into these gutters and is disposed of outside of the skylight. Likewise, condensation that forms on the glass is collected in gutters and released outside the frame. The running off of the condensation into these gutters is contingent, of course, upon the pitch of the glass. If the glass is flat or there is an insufficient pitch, the condensation will drip. In the larger types of skylight construction where one glass span laps over another, the sealing strips at the laps are made with condensate drains. Corrugated glass should not be used in skylight unless there is a very good pitch to the glass and the corrugations run with the pitch and not across it. If the glass is too flat, the condensation will collect on the low ridge of the corrugations and dripping will result.

Double-glazed skylights are not unusual, being constructed of two panes of glass with an air space between, thoroughly insulated and mounted on structural steel bars. Drainage features and the insulation afforded by the double panes of glass (with air space between) afford protection against outside cold air and condensation within, comparable to the common types of roofs on which they are installed.

Double Glazing Effective

By A. B. Fowler
Superintendent of Construction, Erie, Cleveland, Ohio

The normal railroad building where skylights are used is either unheated or only partly heated and presents no special problem other than to be made watertight. In heated buildings where condensation is apt to develop, the use of insulated glass consisting of two or more panes separated by a small air space and hermetically sealed around the edges will, in large measure, prevent condensation.

Where such precautions are taken, and skylights are properly designed to prevent leakage, I do not believe there would be any serious problems encountered.

Methods of Jetting Piles

How does one jet a pile? What type of pump should be used? What water pressure? What size nozzle?

Best in Water-Laden Sand

By W. F. Martens
General Foreman, Bridges and Buildings, Atchison, Topeka & Santa Fe, San Bernardino, Cal.

While piles have been driven with the aid of the water-jet process over a long period of years, there still are so many variables involved as to make it impracticable to prescribe any hard and fast rules for sinking piles in this manner. In fact, like all others, this method is not without limitations and should, therefore, be used only in soils favoring its use. Unless definite information is available anent the type of soil into which the piles are to be driven, it may be necessary to do considerable experimenting in order to develop the combination of equipment, method of procedure, etc., best suited to produce good results.

While the water jet may be used advantageously in any soil that will settle back around the pile after jetting ceases, best results are obtained in pure water-laden sand. However, piles have been driven with the aid of this process in hard-packed gravel strewn with moderate sized boulders, clay, etc., with good success. Care must be exercised when jetting in gravel so as not to wash out the finer materials and leave the boulders or stones in the bottom of the jetted hole, as this may seriously interfere with sinking the pile to the required depth. This action may sometimes be overcome by increasing both the volume and pressure of the water.

When only an occasional boulder is encountered which is not too large, a hole can usually be jetted into which the obstruction can be pushed by the pile. In order to displace such an obstruction, it may be necessary sometimes to raise the pile a little and drop it together with the pile hammer. In soil such as pure sand, one jet may suffice, while in other kinds of soil it may require two or three and sometimes more. Two of these should discharge on opposite sides and near the foot of the pile, and the others at such higher elevations to produce the best results.

The jet may be lowered and raised as required by a manila rope operated through a snatch or other suitable block, which should be attached to the pile-driver leads at an elevation that will best meet the job demand. A light jet may be operated by hand. However, when long and heavy jets, with correspondingly large hoses, are used, the ropes should be operated by a power-operated winch. The use of a friction drum is inadvisable as this is not flexible enough.

The size of the jet pipe, as well as the size and design of the nozzle, depends upon the texture of the soil, size of the pile, and the depth to which it is to be driven. Jet pipes ranging from one inch to four inches in diameter, with nozzle diameters of ½ in. to two inches, have been used with excellent success. However, jets of 1½ to 2½ in., with ¾-in. to 1½-in. nozzles, are more generally used for the normal pile-driving project requiring the aid of a water jet. It is imperative that the nozzle bore be absolutely smooth, as any irregularity in the nozzle tip will cause the water stream to flare to one side, making it difficult to control the jet. This may result in the pile shifting or creeping out of alinement as it sinks into the ground.

While almost any pump that will develop sufficient water pressure, and that will deliver an adequate water supply, can be used for this purpose, the use of antiquated equipment simply because it is readily available is to be discouraged. Its use will, as a rule, result in sub-quality work, and in many cases complete failure. Multiple-stage centrifugal pumps especially designed for this purpose are not only preferable, but are essential for a pile-driving job of any size which justifies the use of the water-jet process. A pump having four to six stages, with a capacity up to 300 g.p.m., and which develops a pressure of 350 lb. p.s.i., is the most suitable for the average railway pile-driving project.

Methods Must Be Flexible

By A. E. Bechtelheimer
Engineer Bridges (Retired) Chicago & North Western, Chicago

When one drives a pile, the displaced earth adjacent to it is compacted; but with a water-jet, part or all of the material displaced is carried in suspension to the surface. The objective in either instance is to secure bearing power and penetration, both of which require experienced engineering talent. In many locations bearing power and penetration can not be secured by driving, but almost any material except hardpan and rock can be penetrated by a combination of jetting and driving. In fact, piles have been placed in certain classes of marl, clay and sand with very little actual driving. The best jetting results are secured in pure sand, which offers very high resistance to driven piles.

The pump must be one that develops a large volume of water at high pressure, and the trend is to use the centrifugal type in capacities of 300 to 600 g.p.m. and pressures of 250 to 300 lb. The character of the material encountered, the size of piles, the depth of penetration, and many other factors have a definite bearing on the success of the work. The velocity must be sufficient to loosen the material, and the volume adequate to force the water to the surface. The diameter of the suction hose should be five to six inches and that of the discharge hose four to five inches. It is important that there be no reduction in size of this hose between the pump and the connection to the flexible hose of the jet pipe, which should be two to three inches in diameter. For this purpose a bent pipe should never be used.

In material that is easily loosened a nozzle is unnecessary, but if required the nozzle should be of a size and shape that will most easily disturb the material, such as ¾ to 1 in. circular, or flattened to ¼ to ½ in. opening.

There is no standard procedure for jetting piles and the best method in a specific instance can be determined only by experimentation. Probably the simplest procedure is to jet the hole to the desired depth, remove the jet, set the pile in the hole quickly, and start driving. If the pile cannot be driven to the desired depth, the jet should be put down along the side of the pile to the tip, and driving and jetting continued simultaneously. In some instances the pile and the jet can be kept constantly moving until the pile is in final position. In all instances the jet must be kept moving, otherwise it will freeze.

In some soils one jet will be sufficient, but if the pile starts out of line the jet must be moved to other positions to keep the pile in the right location. Sometimes two or even three jets are required to obtain penetrations of 20 to 30 ft. In such instances one jet is kept moving with its end slightly below the pile and the other slowly raised and lowered between the bottom of the pile and the surface of the ground to maintain flow along the pile. Since the jet pipes, flexible hose and fittings constitute a heavy load, suitable equipment is needed to handle them expeditiously, and to obtain satisfactory results.

Do Weed Burners Damage Ties?

Does the heat of weed burners damage treated crossties even though they do not become ignited? If so, can this be minimized or prevented? Explain.

Heat Doesn't Shorten Life

By C. D. Turley
Engineer Ties & Treatment, Illinois Central, Chicago

We have had considerable success with weed burners where the vegetation is heavy. It is our custom to have a section gang follow the burner on a motor car pulling a water tank equipped with special hoses for extinguishing fires and preventing them from spreading. It has been our experience that only the old decayed ties catch on fire.

Perhaps the earliest attempt to retard the decay of wood was by charring its surface, and quite likely any slight charring by weed burners would benefit rather than damage the ties.

Occasionally, during hot dry weather, the heat from burners may bring some of the creosote to the surface of the ties, but in that case there would still be sufficient preservative within the tie and the additional creosote on the exposed surface would be beneficial.

It is my opinion, based on several years observation of ties in track, that the use of weed burners has little or no appreciable effect on the service life of crossties.

Little Harm Need Result

By W. J. Burton
Assistant to Chief Engineer, Missouri Pacific, St. Louis, Mo.

Weeds vary greatly as to strength and hence as to the amount of fire required to kill them. On a well-ballasted main line, weeds are mostly on the shoulders and the ties and the track need not be subjected to as much fire as is necessary on a branch line where they have been allowed to grow in the track.

It is usually desirable to precede weed burning with a trip of a mower. This is essential for track of branch-line class which has been allowed to become weedy. Weeds should be burned early enough to destroy the seeds, but choosing the best time for this is neither easy, nor always possible.

The likelihood of damage to the ties depends, of course, upon the length of time heat is applied and the intensity of the flame. On main tracks where most of the killing heat is directed to the shoulder, little if any harm need result to the ties. On branch-line track, where more heat is used, fires are apt to be started in the older ties, which may smoulder for a long time, and eventually destroy their remaining usefulness. Such fires are quite likely to start around the rail seat and more often will occur under the tie plate.

Creosote-treated ties which have a heavy coating of pitch or crude oil residue are much less likely to be ignited than those in which the wood fibres are exposed and where there may be small spots of decay or punk to catch the fire. I know of no data by which it can be shown that the exposure to heat is entirely harmless to the preservative or the ties, even though no fire remains after the burner has passed. However, the benefits of burning no doubt outweigh such losses, if any.

A weed burner operation should always be followed up very carefully and all spots of fire thoroughly doused. While it is sometimes said that ties which catch fire ought to be renewed anyway, it is probable that years of service life are destroyed unless fire is thoroughly extinguished.

Ties Not Damaged

By R. S. Kniffen
General Roadmaster, Great Northern, Duluth, Minn.

The heat of weed burners will not damage treated ties if the burners are operated properly. The right way to kill weeds with a weed burner is to sear them.

To do this it is important to maintain a careful adjustment of air and oil. The best results are obtained with a clear, hot flame. The outlet of the combustion chamber should be kept some distance above the tie and the weed burner should be operated at a speed that will permit the searing of the weeds without any damage to the ties. That this is possible is indicated by the fact that on a hot, clear day the heat of the sun's rays will sear and kill vegetation, but at the same time this heat will not damage treated ties.

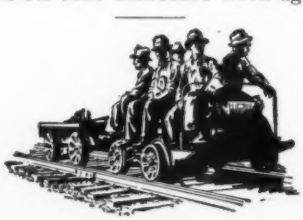
Using Work Trains Overtime

Should work-train crews be called upon to work overtime? Under what conditions? What considerations are involved?

Overtime Hard to Justify

By General Track Inspector

There seems to be no unity of thought as to whether or not work trains should be allowed to work overtime. Conditions existing at the time alter the opinions of officers. In the past orders have been issued, and stringently enforced, that work trains were to make absolutely no overtime. These orders have usually been issued during "hard times" when expenses were being cut. Yet it seems to the man in the field that this only increases the cost of doing the work. This policy often means that an additional train will have to be used some other day and a track gang will have to be taken off their scheduled work again, thereby adding to the cost of the second days' train.



On the other hand, when times are good and freight cars are in demand, work-train overtime means nothing if it can accomplish the release of a car of company material. Even in such "plush" periods, it seems that overtime is seldom permitted for distinct maintenance reasons. Furthermore, as long as work-train performance is measured by the dual standards of the transportation department, who have supervision of the crews, and the maintenance department, who have charge of the work, it is questionable whether overtime can ever be explained on a basis of saving in track labor or maintenance expense. That efficiency index—the crew-overtime report—points an accusing finger too difficult to thwart.

Consequently, it is imperative that maintenance-of-way work trains be staffed with efficient forces; that they be expertly supervised by men capable of exercising good judgment in altering plans to take advantage of sudden opportunities; and above all that these

men have their work planned carefully, thoroughly, and so comprehensively as to permit flexibility. Unless work trains are given adequate attention by those ordering their services, the need for overtime will be always present and, if arbitrarily denied, maintenance costs will mount and work-programs will not only fall behind but may never be completed.

Must Be Supervised

By H. F. Fifield
Engineer M. of W., Boston & Maine, Boston, Mass.

Work trains are an expensive part of maintenance costs and their work must be carefully planned and supervised. Ordinarily their working day should be confined to the regular work period, but there may be times when overtime might be justified to complete a job and thereby permit the cancellation of another train. This is where good planning and supervision will dictate just what is the most economical.

In the old days many supervisors had a permanent work train year in and year out. Those days are gone and supervisors have been educated to program and plan their work to keep this expense to the minimum.

Overtime Often Justified

By Assistant Division Engineer

The use of work trains under the present wage scale creates an expense that must be considered judiciously. The factors of prompt unloading of materials to release cars for other service, and the expense of maintenance-of-way work-train forces are items that must be carefully examined.

Work trains must travel from their terminals or intermediate terminals to the location at which the work is to be performed. They may be delayed by being side-tracked for superior trains both while going to and from the job, and while performing the work of the day. Due to these delays, the maintenance forces may be unable to complete the required work assigned for the day. This may result in having cars partly unloaded, unless the work-train use is extended into the overtime period.

The work train should report to the job at the same time as the maintenance forces and leave for the return to the terminal when the maintenance forces finish their work day unless released earlier by the work-train foreman. The work-train overtime entailed will usually be money well spent if it results in a full day's work for the maintenance forces.

The cost per hour of the normal maintenance work-train force is higher than that of the work-train crew, even under the overtime expense of the latter. For this reason it is more economical to use the work train on overtime than it is to delay the maintenance forces.

Several months ago our work trains were restricted to an eight-hour day. As a result, the maintenance department very often had a productive day of from two to three hours use of the work train.

In most cases a yard work train can accomplish its daily objective without any overtime or, at least, with very little. I believe that work trains should be used to the best advantage of the maintenance department, which will require its use for the full day on the work under progress, and result in a nominal amount of overtime for the work train.

Uses For Cinder Concrete

Under what conditions can cinder concrete be used in railway buildings? What are its advantages and disadvantages?

Low Strength Limits Use

By C. O. Coverley
Architect, Atchison, Topeka & Santa Fe, Chicago

Cinder concrete can be used for reinforced floor and roof slabs of short spans and for fireproofing, but should not be used for walls carrying heavy loads, columns, beams or other structural purposes. Only hard, well-burned, vitreous clinker cinders should be used, and they should be as free as possible from fine ashes, sulphides, unburned coal and other matter. Excessive sulphides in cinder concrete are likely to corrode and destroy metal reinforcement, pipes or conduits imbedded in the concrete. Cinders from anthracite coal are preferable, since they are more nearly free from harmful sulphides. Cinder concrete can also be used as a light-weight fill for floors and roofs where required, in which case it is supported by some other type of structural material. It has also been used in precast block form, being one of the first light-weight concrete blocks developed. Such blocks are used for partitions and for walls which carry relatively light loads.

The principal advantages of cinder concrete are its light weight, which means economical forming and easy handling, and its fire resistant qualities. For light loads and short spans of eight feet or less, flat, solid slabs of cinder concrete, reinforced with wire mesh or metal lath, are more economical than those of stone concrete. Cinder-concrete blocks are fairly inexpensive and easily-handled units for interior partitions and exterior walls supporting light loads; also as back up units for masonry walls and for fireproofing of steel members. Cinder-concrete blocks have some insulating qualities due to the cellular mixture of the material and to the air space in the units.

The principal disadvantages of cinder concrete are its lack of strength for heavy loading and its inability to withstand exposure to the weather. Slabs should not be less than four inches thick with spans of eight feet or less, and unit compressive stress is limited to 300 lb. p.s.i. Plaster cannot be applied directly to the underside of slabs, but must be suspended, thus increasing the cost where plaster is required. Cinder concrete, either poured in place or in block form, must be protected from the weather at all times, either by stucco, cement paint or other means. It is not always economical to use cinder concrete unless the proper type of cinders, as mentioned heretofore, is easily obtainable.

Economical But Not Strong

By M. Hirschthal
Concrete Engineer, Delaware, Lackawanna & Western, Hoboken, N.J.

Cinder concrete may be used in railway buildings where great structural strength is not required, where it does not form a major load carrying member or where less expensive fire protection is desired than that provided by stone concrete.

In buildings which are designed for light loading, the slabs or "jack arches" between the steel beams that form the framing for the floor, and especial-

ly roofs, may be made of cinder concrete, and the steel may be encased with the same material for fire protection. Cinder concrete is used also as an insulating material, particularly in roofs and partitions designed for both fireproofing and soundproofing—double walls separated by an air space.

Cinder concrete may also be used for fire walls in long buildings, except in communities having building codes prohibiting its use. Cinder-concrete blocks are used for walls of small, single-story buildings, as well as for interior partitions in large buildings.

Care must be used in specifying the kind of cinders to be used as the aggregate for cinder concrete. The specifications should require that they be clean cinders of anthracite coal used in firing steam boilers, free from unburned coal or sulphur compounds, and must have the fine ash screened out. Emphasis must be put on the absence of sulphur compounds, for these tend to cause corrosion of conduits and reinforcing steel that may be imbedded in the concrete.

The proportions generally used vary from 1:3:6 to 1:2:4, although richer mixes are used occasionally. The strength of 1:2:4 cinder concrete, at 28 days, is approximately 1,000 to 1,200 lb. p.s.i., and its modulus of elasticity is about 1½ million p.s.i.

The advantages of cinder concrete are its relative lightness (approximately 100 lb. per cu. ft.); the low cost of its aggregate as compared to that of stone, its fire resistance, which is somewhat greater than that of stone or gravel concrete because there is no tendency for the pieces to split; and the ease of handling the mixture, partly because of its lightness.

The economy in the use of cinder concrete does not consist so much in the cost of the floor slabs where it is used—and it is economical there only when the minimum thickness permitted by the building code makes it structurally satisfactory—but in the reduction it effects in the loads on the girders and columns, particularly the latter, in multi-story buildings. When used in fire walls and partitions the economy is direct.

The disadvantages of cinder concrete are its low structural strength, which limits its use to short spans, its permeability when in contact with water, and the special care required in determining whether any sulphur products are present in the aggregate, lest conduits and steel are destroyed by corrosion.

Repairing Water-Service Equipment

What type of organization will give the most satisfactory results in handling repairs to pumps and other water-service equipment, in both the field and shop? Why?

Any Force Needs Equipment

By W. D. Gibson
Water Service Engineer, Chicago, Burlington & Quincy, Chicago

This subject is quite comprehensive and there is opportunity for much discussion as to what is the most efficient organization for handling this class of work. We think that an organization which will produce the best results should begin with a responsible officer at headquarters, preferably in the engineering department where there is opportunity for direct contact with the departments which will prepare such plans, maps, etc., as may be required.

At each division point there should be a field officer who may be the water-service foreman or master carpenter. He should have under him enough repairmen to permit the handling of the work to the best advantage. The character and amount of work done by water-service repairmen varies on different railroads. On some it is their duty to make the necessary inspections and repairs to coaling stations, depot heating plants and Diesel fuel and water facilities. Where their duties are so extensive, it seems advisable that each repairman be provided with a helper. On most divisions of the larger railroads, there is so much electrical apparatus involved in the operation of pumping and treating plants, Diesel facilities, etc., that a competent electrician should be assigned to the water service department in addition to the repairmen and their helpers. Experience has shown that under this plan many electrical failures are avoided and, as a rule, the various plants are operated at the highest efficiency.

The number of repairmen needed on the division and their location is dependent upon the mileage and number of facilities which they are expected to maintain. If trucks or other automotive equipment are available, and experience has shown that the use of such equipment is highly profitable, considerably more territory can be handled by one repairman and a helper. Further, if the division point is centrally located, it is advisable to have the headquarters of all of the repairmen located there so that the master carpenter or foreman can be in contact with them each day. This arrangement also makes possible the maintenance of a central store where pipe, fittings and other materials frequently needed may be kept.

If the division is comparatively long and consists of only a main line and very few diverging branches, it is best to locate repairmen about 150 mi. apart. In this connection, on many railroads, the elimination of a great deal of local train service, coincident with an increase in high-speed train operation has made the use of motorcars more or less hazardous. This increases the advantages in using highway equipment, such as a truck or automobile.

The items of equipment which should be available to each repairman for the maintenance of the facilities which the water-service department is called upon to handle should include, in addition to ordinary small hand tools, a small portable, gasoline-operated trench pump, and cutting and threading equipment to accommodate pipe sizes up to 2½ in. At division headquarters it is advisable to keep available additional heavier equipment. This should include a portable pump having a capacity of 250 to 300 g.p.m., cutting and threading machinery capable of handling pipe up to 12 in. in diameter, a portable gasoline-driven generator with flood lights for possible night work, and other electric tools and heavy pipe-cutting and tapping equipment.

Equipment which enables the detection of pipe leaks and apparatus for locating underground pipe lines has been recently developed. This equipment in many cases has proven highly beneficial and has saved its cost many times over in one operation. Therefore, it is felt that each division should be equipped with these devices.

Where there is an extensive program of water treatment, efficient operation of the treating plants is dependent upon the frequency of inspection by competent water inspectors with enough training in mechanics and chemistry to conduct field analyses and detect minor defects in the treating equipment. Also, this inspector should be able to direct the pump operators in the method of making daily water-sample analyses which will detect sudden major changes in

(*Continued on page* 318)

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the raw water quality at their particular station. It is felt that in order to have a reliable control of this feature of water supply, the responsibility should be separate from that of the operation and maintenance of the general equipment. This can best be accomplished by having the water inspectors report to the system chemist or engineer of test.

At each division point a small shop should be maintained where pumps, water cranes, valves and other equipment needing minor repairs can be overhauled. This shop may also be maintained as a small storehouse for light equipment, such as the small pipe, fittings and valves used from day to day in the maintenance of the various facilities. Larger equipment needing major repairs can be handled more economically at one of the major shops than is possible with local forces.

Providing Emergency Lighting

What facilities should be provided for furnishing an adequate amount of light for emergency track work at night? Where should such facilities be stored? Why?

Uses Portable Generators

By A. J. Neff
Supervisor of Work Equipment, Denver & Rio Grande Western, Denver, Colo.

Portable generators with a number of floodlights are the most desirable means of furnishing adequate light for large-scale emergency track work at night. It is desirable that these generators have a capacity of five or seven kilowatts, and that they be mounted on wheels so they can be moved easily. One of these machines should be stored at each terminal where trucks are located so it can be moved quickly to the scene of the emergency.

At wrecks and other emergencies where a large number of men are distributed over a wide area, a single generator is hardly sufficient. However, even then one or two will provide an adequate amount of light for a large gang. If other generators are not available, carbide flares can be used successfully.

Likes Electric Hand Lamps

By E. H. Barnhart
Division Engineer, Baltimore & Ohio, Garrett, Ind.

Prior to the first world war very little attention was paid to furnishing light to trackmen at night, except insofar as relief cranes were equipped with floodlights and it was convenient to use them to assist trackmen in their work. During this period trackmen were supposed to depend upon oil torches and oil lanterns and lamps. This very seriously slowed down the track repairs. Subsequently, the use of carbide flares came into use and in a number of territories section forces were equipped with them. Later on, small, portable, gasoline-driven, generator sets came on the market. Now the use of such sets very materially aids in furnishing light for track work. Considerable improvement has also been made in floodlighting in connection with the operation of relief cranes. Where this equipment is not available the use of the small gasoline electric generator sets should be provided for emergency track work.

In addition, where section gangs are required to go out at night for emergency repairs, such as to change a broken rail, the dry-cell electric hand lamp can be of vast assistance in furnishing the required amount of light for this type of work. If each section were equipped with at least one of these lights, it would very materially reduce the amount of time required for small emergencies at night. Where larger emergency jobs occur, portable generator sets should be available, either at the supervisor's or roadmaster's headquarters, or if the division headquarters are central, stored there so that they can be transported readily by truck or train to the scene of the emergency.

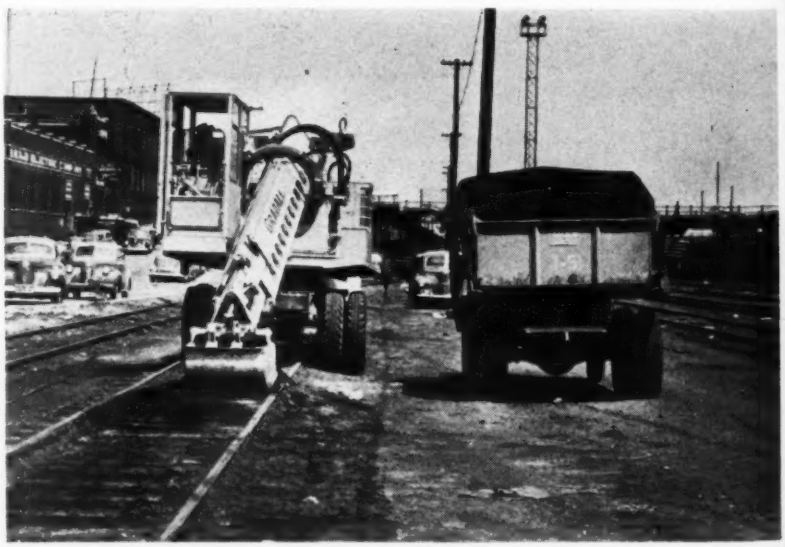
Carbide Lights Helpful

By N. F. Alberts
General Foreman, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Electric hand lamps should be provided for supervisory employees in the track department. Among those who need them are supervisors, foremen, assistant foremen, and key men who may be called to lead a few laborers in performing emergency track work at night.

The use of carbide water lights has proved quite satisfactory in handling emergency track work, such as wrecks, run-through switches and minor derailments, and for replacing track materials at night when that is necessary. The number of cans of carbide to be used depends, of course, on the amount of track involved in the repairs. These lights should be placed as near the work as possible and about 30 or 40 ft. apart. This kind of lighting equipment will furnish adequate light for trackmen to handle repair work.

Foremen who are expected to meet night emergencies should keep a supply of carbide lights and receptacles for holding water at each of their headquarters and should be thoroughly familiar with their correct handling. In addition, roadmasters should store an adequate supply at their headquarters so that foremen can replenish their stocks quickly when needed.



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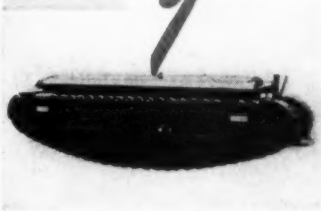
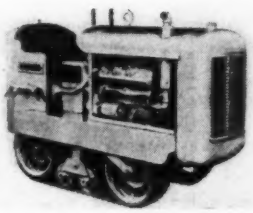
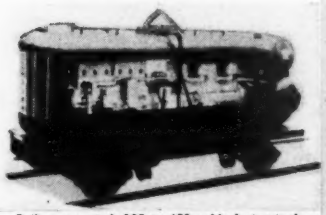


Off-track crawler, gasoline or Diesel
Operates up to 24 tampers.

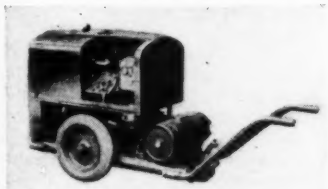


Model 60 Crawler for 4 tampers.

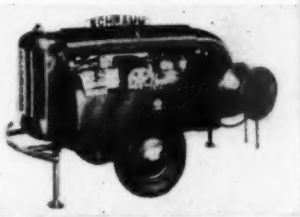
Model 60 self-propelled rail car.



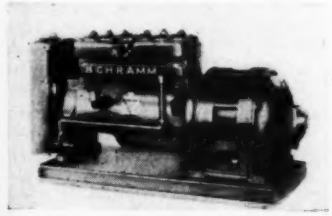
Railcar mounted, 105 to 420 cubic feet actual air capacity.



Model 60 Tampair for 4 tampers.



Two-wheel trailer, 60 to 105 cubic feet actual air capacity.



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THE MONTH'S NEWS

Happenings among railway men— the associations—the suppliers

Changes in Railway Personnel

General

T. M. Goodfellow, division engineer of the Pittsburgh division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been appointed assistant superintendent of freight transportation of the Central region, at Pittsburgh.

Kenneth R. Ketcham, assistant superintendent of the Hinton division of the Chesapeake & Ohio, with headquarters at Hinton, W. Va., and an engineer by training and experience, has been promoted to superintendent, with the same headquarters. Mr. Ketcham was born at West Millgrove, Ohio, on December 31, 1902, and has been with the C. & O. since June, 1920, when he was employed as a rodman, subsequently holding the positions of draftsman, instrumentman, assistant engineer, assistant trainmaster and trainmaster. In September, 1944, Mr. Ketcham was appointed assistant superintendent of the Hinton division, which position he held at the time of his recent promotion.

B. S. Sines, superintendent of the Salt Lake division of the Southern Pacific at Ogden, Utah, and an engineer by training and experience, has been promoted to executive representative, with headquarters at San Francisco, Cal. Mr. Sines received a degree in civil engineering from Cornell university, and entered the service of the S.P. in 1925 as an instrumentman on the company's lines in the southwest. He was later advanced to assistant engineer, and in 1933 went to the road's general office at San Francisco, where he subsequently became an executive assistant in the president's office. He became trainmaster on the Sacramento division in 1944 and assistant superintendent on the Tucson division later the same year. In 1946 Mr. Sines was promoted to superintendent of the Salt Lake division, which position he was holding at the time of his recent appointment.

William H. Hillis, whose election as vice-president—operations, of the Chicago, Rock Island & Pacific, was reported in the February issue, was born at Colona, Ill., on March 31, 1886, and entered railway service in 1906 as a rodman on the Chicago, Burlington & Quincy at Beardstown, Ill. He later served in various capacities in the engineering department of that company until 1911, when he was appointed roadmaster. During the following five years he served in that position on various divisions, and was later transferred to the operating department as trainmaster on the Aurora division. In 1925 Mr. Hillis was appointed district engineer of maintenance of the Illinois district, with headquarters at Galesburg, Ill., and in 1927 he was advanced to assistant superintendent of the LaCrosse division. Three years later he

William H. Hillis

was transferred to the Galesburg division, and in 1931, he was sent to Texas, where, as superintendent of construction, he had charge of the construction of a 110-mile line between Childress, Tex., and Pampa. Following the completion of this line, he returned to the LaCrosse division as assistant superintendent. In 1936 Mr. Hillis went with the Rock Island as engineer maintenance of way, and in 1939 he was promoted to assistant chief operating officer. He was further advanced on July 1, 1942, to operating officer, which position he held at the time of his recent election as vice-president—operations, with headquarters, as before, at Chicago.

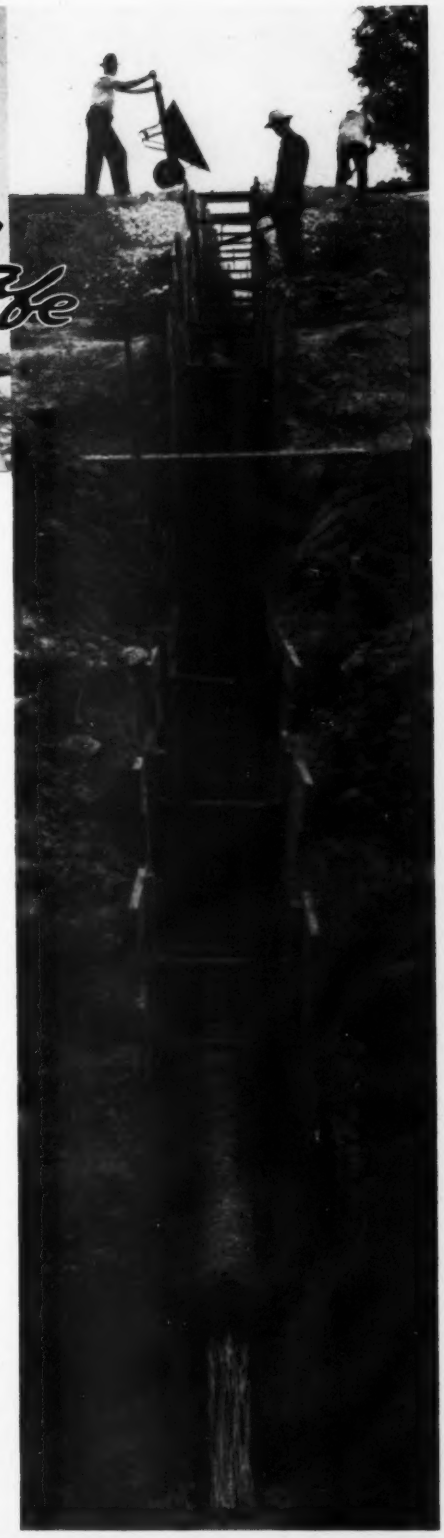
S. T. W. Green, general superintendent of the Lehigh & New England, with headquarters at Bethlehem, Pa., and an engineer by training and experience, has been elected vice-president and general manager, with the same headquarters. Mr. Green was born at Baltimore, Md., on January 6, 1894, attended Baltimore Poly-

S. T. W. Green

technic Institute and received his C. E. degree from Cornell University in 1916. He entered railroad service in 1911 in the engineering department of the Baltimore & Ohio, and was employed by the engineering department of the Baltimore Sewerage Commission in 1912. Mr. Green attended Cornell University College of Civil Engineering from 1914 to 1916, and then went with the Bureau of Valuation of the Interstate Commerce Commission. From 1917 to January, 1931, he held various positions in the valuation department of the Baltimore & Ohio, except during the war period when he served overseas as lieutenant in the engineer reserves. Mr. Green served as valuation engineer and real estate agent of the Lehigh & New England from January, 1931, to May, 1936, becoming assistant to general superintendent of that road on the latter date. In January, 1939, he became superintendent of the L. & N. E. and in February, 1945, he was appointed general superintendent of that road.

Robert J. Stone, superintendent on the St. Louis-San Francisco, with headquarters at Springfield, Mo., and an engineer by training and experience, has been elected assistant general manager of the Western district, with the same headquarters. Mr. Stone was born on January 16,

(*Continued on page 322*)



WHEN you have water in a fill (like the one shown here) under rails burdened with today's pounding traffic loads, constant slides and track settlement, with continuous excess maintenance expense and ever-present operating hazards, always result. It is good sense to get rid of the water.

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Precarious conditions such as those in the fill are like a cancer in that they never cure themselves but, unless treated, keep on getting worse. Unlike cancer, however, they can usually be cured by the "surgery" of properly-installed drainage.

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(*Continued from page 320*)

1907, at Louisville, Ky., and received his higher education at Purdue university. He entered railroad service in 1928 as a rodman and junior engineer on the Southern at St. Louis, Mo., and in 1934 he became a student apprentice on the road's Birmingham division. He subsequently held positions successively as assistant to division engineer at Somerset, Ky., track supervisor at Dayton, Tenn., and Oakdale, assistant trainmaster at Somerset, and trainmaster at Selma, Ala., Valdosta, Ga., Hattiesburg, Miss., and Birmingham, Ala. In February, 1946, Mr. Stone was promoted to assistant superintendent at Sheffield, Ala., and the following month was appointed superintendent at Selma. He joined the Frisco in February, 1947, as superintendent at Fort Scott, Kan., and was later transferred to Springfield.

Engineering

C. H. Hardwick, engineer maintenance of way of the Chicago, Rock Island & Pacific at Chicago, has been appointed district maintenance engineer, with headquarters at Des Moines, Iowa.

W. E. Fuhr, assistant division engineer of the Chicago, Milwaukee, St. Paul & Pacific at Mason City, Iowa, has been promoted to division engineer at Ottumwa, Iowa, succeeding **J. W. McReynolds,** who has resigned.

A. J. Anderson, assistant division engineer of the Chicago, Milwaukee, St. Paul & Pacific at LaCrosse, Wis., has been promoted to division engineer of the Idaho division at Spokane, Wash., succeeding **W. E. Ross,** who has resigned to accept a position with Morrison-Knudsen Company, Inc., a contracting firm.

R. G. Schultz, assistant division engineer on the Southern Pacific, with headquarters at El Paso, Tex., has been promoted to division engineer at San Antonio, Tex., succeeding **G. A. Boyer. H. A. Hunt,** supervisor of bridges and buildings at Houston, Tex., has been advanced to assistant division engineer, with headquarters at El Paso to succeed Mr. Schultz.

G. C. Vaughan, division engineer on the Williamsport division of the Pennsylvania, has been transferred to the Pittsburgh division, with headquarters at Pittsburgh, Pa., to succeed **T. M. Goodfellow,** whose promotion to assistant superintendent of freight transportation is reported elsewhere in these columns. **J. F. Piper,** assistant division engineer on the Ft. Wayne division, has been promoted to division engineer, at Williamsport, to succeed Mr. Vaughan, and **J. H. Ault,** supervisor of track on the Middle division at Newport, Pa., has been promoted to assistant division engineer on the Ft. Wayne division of the Western region, succeeding Mr. Piper.

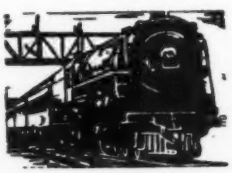
Fred W. Creedle, whose promotion to assistant engineer maintenance of way of the Chicago & North Western, with headquarters at Chicago, was noted in the February issue, was born at Fulton, Ky., on July 20, 1900, and attended the University of Kentucky. He entered the service of the Illinois Central in September, 1922, serving in various capacities on that road until 1927 when he went with the C.&N.W.

Fred W. Creedle

as draftsman and assistant engineer. In 1940 he was promoted to division engineer, and served in that capacity at various locations until his recent appointment as assistant engineer maintenance of way.

Frank R. Paisley, whose promotion to chief engineer of the Pittsburgh & Lake Erie, was reported in the January issue, was born at Beaver Falls, Pa., on December 29, 1889. After attending Carnegie Institute of Technology, Mr. Paisley entered the service of the P. & L. E. on August 23, 1911, and served successively as chainman, rodman and transitman until October 16, 1922, then becoming inspecting engineer and engineering assistant. On January 15, 1935, Mr. Paisley was appointed engineer maintenance of way and on October 1, 1942, he became assistant chief engineer at Pittsburgh, which position he held until his recent promotion to chief engineer of the P. & L. E.

Frank R. Paisley



William R. Rhodes, whose promotion to assistant division engineer on the Missouri Pacific at St. Louis, Mo., was reported in the February issue, was born at St. Louis on January 21, 1885, and entered railroad service in 1906 as a clerk on the St. Louis-San Francisco. In 1909 he was employed by the Missouri Pacific as a rodman on new line construction in southern Illinois, and was subsequently advanced through various positions until 1916 when he was appointed assistant engineer in the bridge department. After serving in this capacity at various locations, he was transferred to the engineering department, serving as assistant engineer until his recent appointment.

Newton W. McCallum, whose retirement as chief engineer of the Pittsburgh & Lake Erie at Pittsburgh, Pa., was reported in the January issue, was born at Renovo, Pa., on November 8, 1878. Mr. McCallum received his B.S. degree in civil engineering from Pennsylvania State College in 1899, and entered railroad service on June 15 of that year as a rodman on the New York Central. He was appointed bridge inspector on January 1, 1900; assistant supervisor of bridges in 1902; supervisor of bridges in 1904, and supervisor structures of the Electric division in 1907, all with the New York Central. Mr. McCallum was appointed division engineer of the Ontario division of that road in 1920, being transferred to the Electric division in 1923. He was appointed assistant chief engineer of the P. & L. E. in 1940, and became chief engineer later that same year.

Newton W. McCallum

J. H. Barksdale, whose appointment as assistant division engineer on the Chesapeake & Ohio, with headquarters at Covington, Ky., was noted in the February issue, was born at Halifax, Va., on September 20, 1907, and attended Hampden-Sidney College and the University of Virginia. He entered the service of the C. & O. as a chainman at Richmond, Va., and served successively as rodman and instrumentman at that point until 1941, when he was appointed cost engineer, with headquarters at Ashland, Ky., and later at Pikeville. In 1944 he was made assistant

(*Continued on page 324*)

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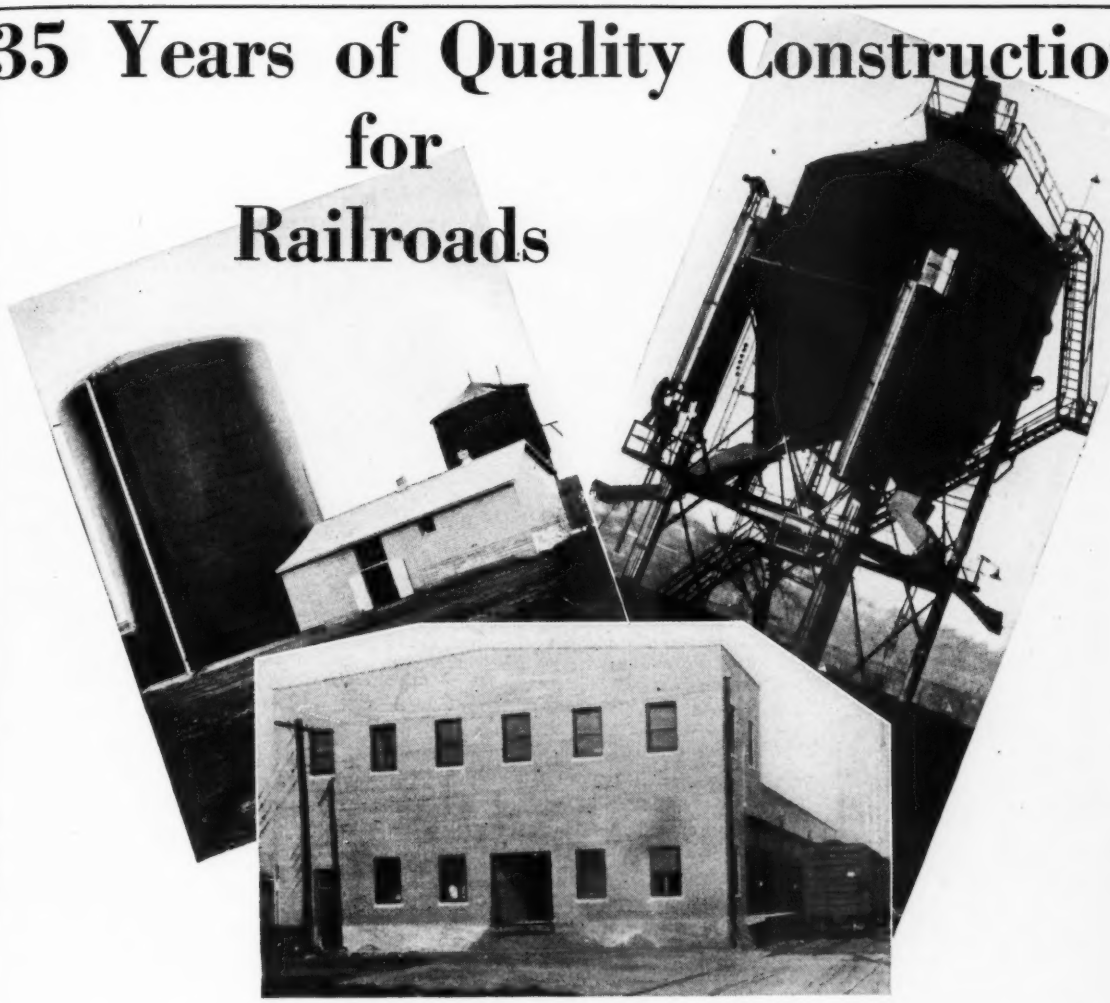

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(*Continued from page 322*)

supervisor of track at Chillicothe, Ohio, and in 1945 was advanced to supervisor of track at St. Albans, W. Va., which position he was holding at the time of his recent appointment.

Harold T. Livingston, whose appointment as chief engineer, maintenance of way and structures of the Chicago, Rock Island & Pacific was reported in the February issue, was born at Golden City, Mo., on November 10, 1888, and was graduated from the University of Missouri with a B.S. degree in civil engineering in 1908. In 1905, during school vacation, he served as a chainman with the St. Louis-San Francisco, and in January, 1909, he entered the service of the Southern Pacific as an inspector on construction. In May of the same year he went with the Rock Island as an instrumentman, and subsequently advanced through the positions of assistant engineer, division engineer and master carpenter. From 1917 to 1919 he served as first lieutenant and captain with the engineer corps, returning to the Rock Island in July of the latter year. His subsequent career was as follows: July, 1919-December, 1929, division engineer; January, 1930-November, 1931, engineer of construction; November, 1931-April, 1936, division engineer; May-June, 1936, assistant superintendent; July, 1936-April, 1939, district maintenance engineer; May-July, 1939, superintendent. In August, 1939, Mr. Livingston was appointed engineer of bridges, the position he held at the time of his recent promotion.

Harold T. Livingston

A. M. Westenhoff, whose appointment as engineer of construction on the New York Central, with headquatrers at Chicago, was noted in the February issue, was born at Cincinnati, Ohio, on March 15, 1892, and was graduated from the University of Cincinnati with a degree in civil engineering in 1914. He entered railroad service in January, 1918, as a designer on the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, and from 1923 to 1940, he served as assistant engineer at Sidney, Ohio, and Cincinnati. In 1941 he was appointed assistant engineer of bridges on the New York Central at Chicago, and from 1943 to 1947 he served as assistant engineer of structures at Cleveland, Ohio, which position he was holding at the time of his recent appointment as engineer of construction.

Track

A. C. Godden, roadmaster on the Canadian National, at Palmerston, Ont., has been transferred to Hamilton, Ont., to succeed **C. Martin,** who in turn succeeds Mr. Godden at Palmerston.

M. E. Goddard, apprentice foreman of the four short lines of the Central of Georgia, has been promoted to roadmaster of the short lines, to succeed **Bruce Suggs,** who has retired after 46 years of railroad service.

H. L. Scott has been appointed roadmaster on the Sudbury, Key Harbour and Sudbury Terminal subdivisions of the Canadian National, with headquarters at Capreol, Ont., to succeed **W. H. Johnson,** transferred.

R. T. Roebuck, section foreman on the Southern Pacific at Lufkin, Tex., has been advanced to assistant roadmaster, with headquarters at Houston, Tex., succeeding **S. S. Lovell,** who has been transferred to San Antonio, Tex., to succeed **F. W. Erck,** who has been promoted to roadmaster at that point.

L. Allen, track supervisor on the Chicago, Indianapolis & Louisville at Bedford, Ind., has been promoted to general roadmaster, with headquarters at Lafayette, Ind., and **Byron Bowers** has been appointed track supervisor at Bedford to succeed Mr. Allen. **Lester Johnson** has been appointed track supervisor at Bloomington, Ind., a newly-created position.

W. P. Higginbottom, assistant track supervisor on the Southern at Sheffield, Ala., has been promoted to track supervisor, with headquarters at Huntsville, Ala., succeeding **James B. Starr,** who has been transferred to Cleveland, Tenn. **Sherman A. Mynatt,** track supervisor at Cleveland, has been transferred to Clinton, Tenn., replacing **Ernest R. Thornburg,** who has been transfererd to Knoxville, Tenn.

LeVere E. Natzel, whose promotion to roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Green Bay, Wis., was reported in the February issue, was born at Portsmouth, Iowa, on July 23, 1910. He entered the service of the Milwaukee in 1926, working as a section hand during school vacations, and in 1936 he was appointed yard foreman at Montevideo, Minn. From 1945 to 1948 he served successively as gang foreman and general foreman, and was holding the latter position at the time of his recent appointment.

Russell G. Scott, whose promotion to roadmaster on the Chicago, Milwaukee, St. Paul & Pacific at Milwaukee, Wis., was reported in the February issue, was born at Blakesburg, Iowa, on July 1, 1909, and entered the service of the Milwaukee in April, 1929, as a section laborer. After serving for a time with a bridge and building crew, he was appointed assistant section foreman in April, 1935, being subsequently promoted to section foreman, extra gang foreman and general foreman. He was holding the latter position at the time of his recent appointment.

W. M. Tharp, whose appointment as roadmaster on the Atlantic Coast Line, with headquarters at Goldsboro, N.C., was noted in the February issue, was born at Darlington, S.C., on July 21, 1916. He entered the service of the A. C. L. in 1938 as a laborer in the bridge and building department at Rocky Mount, N.C., and served successively as chainman, assistant foreman, extra gang foreman and supervisor of supplies until 1947 when he was made acting roadmaster, which position he was holding at the time of his recent appointment.

L. W. Hogston, supervisor of track on the St. Louis division of the Pennsylvania, at Terre Haute, Ind., has been transferred to the Middle division, with headquarters at Newport, Pa., to succeed **J. H. Ault,** whose promotion to assistant division engineer is reported elsewhere in these columns. **R. D. Jordan, Jr.,** supervisor of track on special duty in the office of the controller, at Philadelphia, Pa., has been transferred to the St. Louis division, to succeed Mr. Hogston.

Thomas F. Maloney, Jr., assistant supervisor of track on the Eastern division of the New York Central, at Brewster, N. Y., has been transferred to Subdivision 4, Eastern division, with headquarters at Hudson, N. Y., where he succeeds **John J. Cox,** who has been transferred to Subdivision 1, Boston division, with headquarters at Allston, Mass. **Wm. J. Bergamo,** a member of the engineering corps on the Syracuse division, has been promoted to assistant supervisor of track on Subdivision 29, at Brewster, to succeed Mr. Maloney.

William N. Taggart, whose appointment as supervisor of track on the Pennsylvania at Grand Rapids, Mich., was reported in the February issue, was born at Media, Pa., on July 30, 1918, and attended Lafayette College. During school vacations he worked as a trackman for the Pennsylvania and the Pennsylvania-Reading Seashore Lines, and after graduating from college in 1941 he went with the Pennsylvania as an engineer apprentice in the maintenance of way and structures department. From 1942 to 1945 he served with U.S. Navy construction battalions, returning to the Pennsylvania in the latter year as an assistant on the engineer corps at New Brunswick, N.J. In 1946 he was advanced to assistant supervisor of track at Niles, Ohio, being later transferred to Washington, D.C., where he remained until his recent promotion.

Lynn A. Pelton, whose appointment as supervisor of track on the Pennsylvania, with headquarters at Logansport, Ind., was noted in the February issue, was born at St. Paul, Minn., on September 14, 1918, and received his higher education at the University of Minnesota. He entered the service of the Pennsylvania in October, 1941, as an engineer apprentice

(*Continued on page 326*)

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(*Continued from page 324*)

at Crestline, Ohio, and in 1942 he was made an assistant on the engineer corps, with headquarters at Indianapolis, Ind. From 1943 to 1946 he was a lieutenant in the civil engineer corps of the U.S. Naval Reserve, returning to the Pennsylvania in March, 1946, as an assistant on the engineer corps at Piqua, Ohio. In July, 1946, he was advanced to assistant supervisor of track at York, Pa., and was later transferred to Carnegie, Pa.

Thomas C. Netherton, whose appointment as track supervisor on the Pennsylvania, with headquarters at Wheeling, W. Va., was reported in the February issue, was born at Wichita Falls, Tex., on January 23, 1920, and received his higher education at the University of Michigan. He entered the service of the Pennsylvania in July, 1941, as an engineer apprentice at Derry, Pa., and was later made an assistant on the engineer corps at Blairsville, Pa. From 1942 to 1945 he was in the Army, serving in the Military Railway Service, being commissioned a second lieutenant in the field. In this capacity he served with the 727th Railway Operating Battalion in Italy, France and Germany. In 1945 he returned to the Pennsylvania as an assistant on the engineer corps at Freedom, Pa., and was later appointed assistant track supervisor at Cresson, Pa., and Trenton, N.J.

Bridge and Building

A. R. G. Hamilton has been appointed bridge and building master on the Hornepayne division of the Canadian National, at Hornepayne, Ont., to succeed **T. J. O'Brien,** who has been transferred to the Allandale division, with headquarters at Allendale, Ont., where he in turn succeeds **F. W. McKay,** retired.

G. C. Johnson, assistant supervisor of bridges and buildings on the Galena division of the Chicago & North Western, with headquarters at Chicago, has been promoted to supervisor of bridges and buildings, with the same headquarters, to succeed **Andrew Olson,** whose death is noted elsewhere in this issue.

C. E. Helmle, assistant bridge and building supervisor on the Victoria division of the Southern Pacific, has been promoted to bridge and building supervisor on the Houston division, with headquarters at Houston, Tex., succeeding **H. A. Hunt,** whose promotion to assistant division engineer is noted elsewhere in this issue.

Obituary

Andrew Olson, bridge and building supervisor on the Galena division of the Chicago & North Western, with headquarters at Chicago, died at his home in that city on February 1.

H. L. Bunn, assistant engineer on the Texas & Pacific, with headquarters at Alexandria, La., died at the T.&P. Employees Hospital in Marshall, Tex., on January 28, after a brief illness.

(*Please turn to page 328*)

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BROWNHOIST DIESEL ELECTRIC LOCOMOTIVE-CRANE

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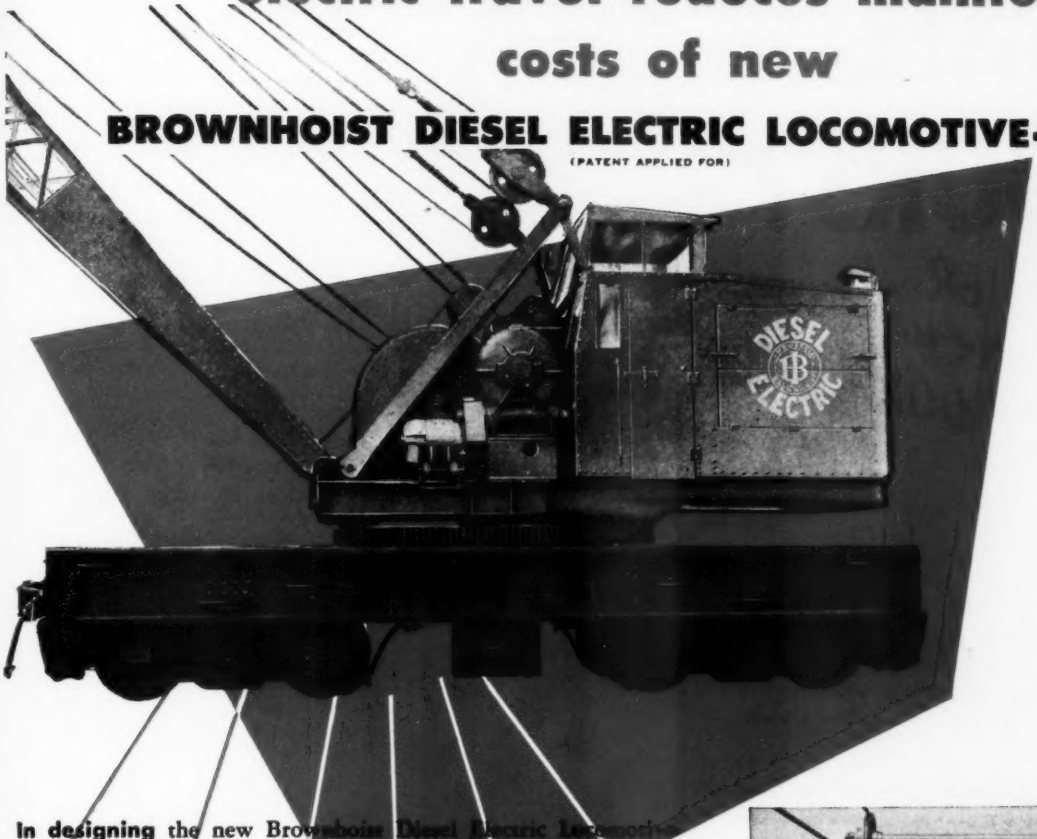
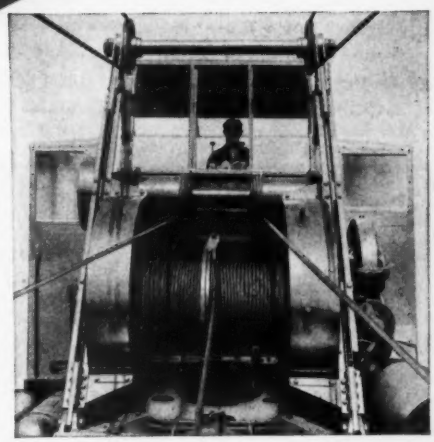


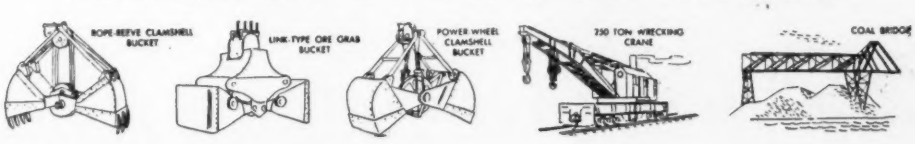
In designing the new Brownhoist Diesel Electric Locomotive-Crane for double duty as a powerful crane and switch engine, Brownhoist engineers had two prime objectives: to increase operating efficiency and reduce maintenance costs. The new Brownhoist Diesel Electric supplies *travel power directly to the axles from two oversize spring-mounted motors hung inside the AAR cast steel side frame trucks. Power for hoist, swing, and booming is transmitted through a helical gear reducer.* Simple, efficient, trouble-free!

These are only two of the many *money-saving, labor-saving, time-saving* features engineered into the Brownhoist Diesel Electric Locomotive-Crane. Others include the patented Monitor-type cab that affords the operator 360° visibility—travel speeds up to 15 M.P.H.—double disc roller bearing mounted rotating clutches —roller bearing boom tip sheaves—14" safety clearance between car body and rotating bed—safe worm driven boom hoist. Capacities 30 tons and up. Write for complete facts that will show you how to *speed and simplify your material handling at lower costs.*



This view shows how the electric travel reduces the crane crab mechanism to a minimum with only three widely spaced horizontal shafts accessible from all sides. Note the 360° vision Monitor-type cab with hoist and boom hoist drums in full view of operator.

BROWNHOIST BUILDS BETTER CRANES



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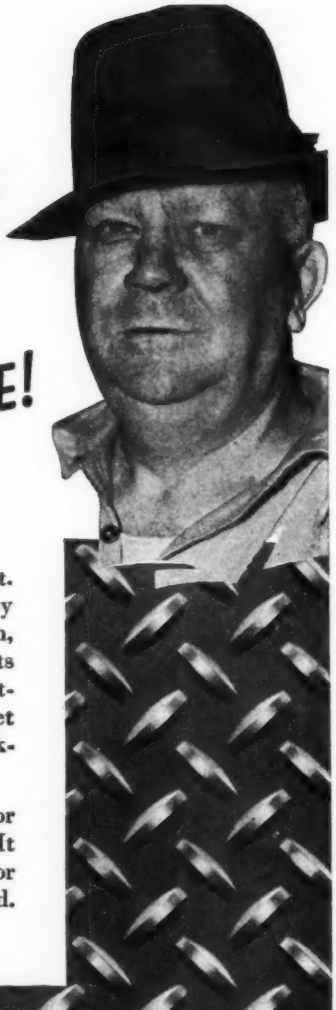

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INLAND 4-WAY FLOOR PLATE

Association News

Maintenance of Way Club of Chicago

The last meeting of the club, held on March 1 at Harding's at the Fair, was addressed by J. L. Loucks, sales engineer, Union Switch & Signal Co. Mr. Loucks spoke on the subject of The Interlocking Interests of the Signal and Roadway Officers.

The program for the next meeting of the club, which will be held on March 22, had not been announced at the time of going to press.

Metropolitan Maintenance of Way Club

The Value of Work Equipment in Effecting Economies in Maintenance was the subject of an address presented before the club at its meeting on February 26 at New York, by S. R. Hursh, assistant chief engineer-maintenance, Pennsylvania. Mr. Hursh placed particular emphasis on the "real" value of work equipment, as distinguished from the book value, and presented many suggestions for getting the maximum return on the investment in such equipment. He also described in detail a system that is in effect on the

(*Continued on page 330*)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 16-18, 1948, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual meeting, April 27-29, 1948, St. Paul, Minn. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D. C.

Bridge and Building Supply Men's Association—Joint exhibit with Track Supply Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association. E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, March 22, 1948. C. R. Knowles, secretary-treasurer, 105 W. Adams street, Chicago 3.

Railway Tie Association—Annual meeting, August 30-September 1, 1948, Greenbriar Hotel, White Sulphur Springs, W. Va. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

National Railway Appliances Association—Thirty-ninth annual exhibit, Chicago, March 15-18, 1948, in connection with A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 20-22, 1948, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Joint exhibit with Bridge and Building Supply Men's Association, September 20-22, 1948, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association. Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

Through more than sixty years of railroad progress

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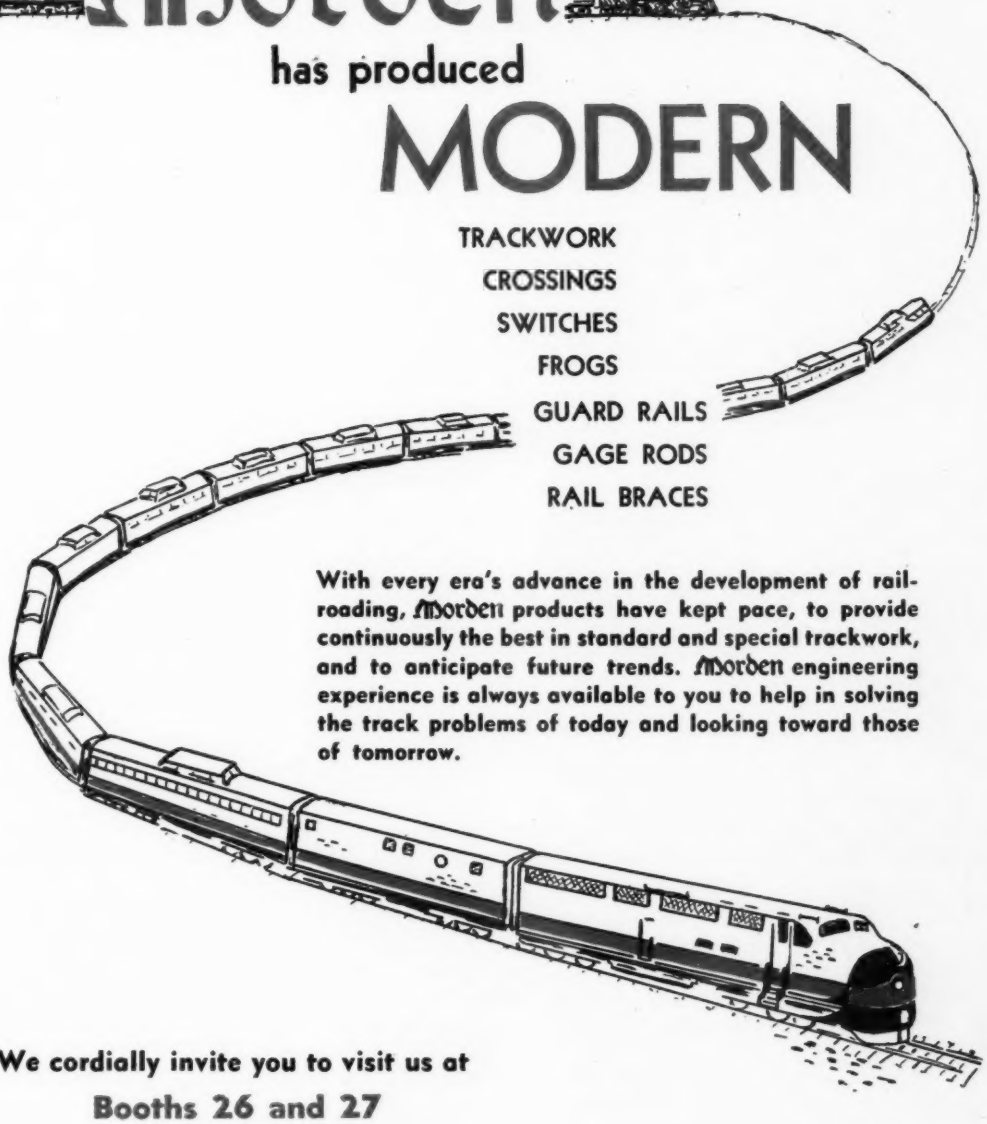

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With Simplex Jacks and other maintenance equipment these are savings you can depend on—day after day—to help you reduce overall maintenance costs. Efficiency is built right into every Simplex Jack, along with the durability, ease of operation and safety that have made Simplex by far the preferred Jack in the railroad field.

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Mechanism is at the top of the Jack; broad toe lift has minimum height of 4⅜".

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High capacity; easy lifting; light in weight; easy to operate.

Simplex G-Y Tie Spacer
Saves ties from being sledged; reduces man-hours in straightening ties.

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Enable one man to replace rail pounding crew.

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Jacks

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(*Continued from page 328*)

Pennsylvania designed to obtain the most effective use of bulldozers and other off-track equipment in clearing the tracks after derailments.

Roadmasters' Association

President A. B. Chaney has called a meeting of the Executive committee of the association to be held at the Engineers' Club, Chicago, on March 15, beginning at 9:30 a. m. The primary purpose of this meeting will be to make preliminary plans for the convention to be held in September, coincident with that of the Bridge and Building Assn., and to decide upon specific features of the program. Following is a list of the committees that have been appointed to prepare reports for presentation at the convention, with the names of the chairmen and vice-chairmen:

No. 1—Modern Methods of Controlling Vegetation and Woody Plants—A. E. Botts (chairman), asst. ch. engr., C. & O., Richmond, Va.; H. E. Carter (vice-chairman), rdm., N. & W., Petersburg, Va.; J. F. Smith (vice-chairman), rdm., M.P., Little Rock, Ark.

No. 2—Functions and Responsibilities of Section Gangs—H. C. Fox (chairman), div. engr., Sou., Greensboro, N.C.; L. A. Evans (vice-chairman), div. engr., P.R.R., Philadelphia, Pa.; M. D. Packham (vice-chairman), rdm., A.T. & S.F., Emporia, Kans.

No. 3—Keeping Power and Spring Switches in Operation During Winter Storms—A. B. Hutson (chairman), rdm., C.B. & Q., Galesburg, Ill.; D. Zoli (vice-chairman), supvr. trk., G. T. W., Detroit, Mich.; W. J. Cable (vice-chairman), div. engr., M.StP. & S.S.M., Stevens Point, Wis.

No. 4—Educating Track Employees in the Cost of Materials, Tools and Equipment—E. L. Anderson (chairman), asst. ch. engr., St.L.-S.F., Springfield, Mo.; C. G. Deppen (vice-chairman), trk. supvr., Reading, Pottstown, Pa.; C. T. Nix (vice-chairman), rdm., S.A.L., Abbeyville, S.C.

No. 5—Use of Work Equipment at Derailments and in Coping with Other Emergencies—P. S. Settle (chairman), trk. supvr., P.R.R., Perryville, Md.; J. R. Murray (vice-chairman), rdm., D. & R.G.W., Green River, Utah; E. F. Saum (vice-chairman) asst. engr., N.Y.C., Erie, Pa.

No. 6 — Reducing Rail Joint Maintenance — R. R. Manion (chairman), engr. m. w., G.N., St. Paul, Minn.; W. H. Haggerty (vice-chairman), N.Y.N.H. & H., New Rochelle, N.Y.; M. L. Denny (vice-chairman), trk. supvr., Indianapolis Union, Indianapolis, Ind.

Bridge and Building Association

President J. S. Hancock has called a meeting of the Executive committee of the association to be held in Chicago on Tuesday, March 16, this date being coincident with the convening of the annual meeting of the American Railway Engineering Association. The meeting of the Executive committee will start with luncheon at the Carson Pirie Scott store at 12:15. With the work of the technical committees well under way, the purpose of this meeting will be to give preliminary consideration to the plans for the annual convention to be held in September.

American Railway Engineering Association

As indicated on pages 286 and 287 of the feature section of this issue, plans have been completed for the annual meeting of the association that is scheduled to be held at the Palmer House, Chicago, on March 16-18. Since all of the com-

(*Continued on page 332*)

always ready—

- to tackle springtime maintenance work, on a few hours' notice—re-shaping ballast, clearing ditches, reestablishing good drainage.
- and to whip unexpected late snows from classification yards, buck the drifted cuts, keep the traffic moving.

This year-round worker does the job of an army of men—better!

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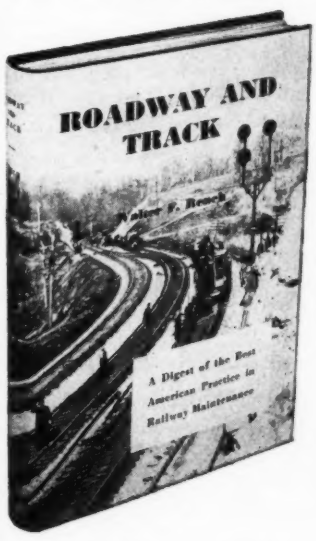

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By Walter F. Rench

Formerly Supervisor on the Pennsylvania Railroad; Author of Simplified Curve and Switch Work

The new edition features the use of the latest mechanical equipment in connection with roadway and track maintenance. Older methods employed where full mechanical equipment is not available are also explained. While most of the methods described are those which are standard on the Pennsylvania, A.R.E.A. recommended practices and those in use on other well maintained roads have also been included.

Outstanding types of mechanical equipment used in track work are described and illustrated with action photographs. Engineering drawings show working details. The economies resulting from the adoption of modern methods are clearly outlined. Useful tables have been added to make the book suitable for reference use, as well as a practical handbook on modern methods.

For Track Supervisors

While written primarily to serve the needs of track supervisors and other maintenance officers, the new edition contains material of considerable interest to transportation and mechanical officers who require a working knowledge of the fundamentals of maintenance of way practice. Section and extra-gang foremen who wish to acquire a broader knowledge of their work and of methods used elsewhere, will find the book helpful.

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To obtain one of the first copies send in your order today. Give it a ten-day examination. If it is not the track book you have been looking for you can mail it back.

CONTENTS

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Part II—TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals

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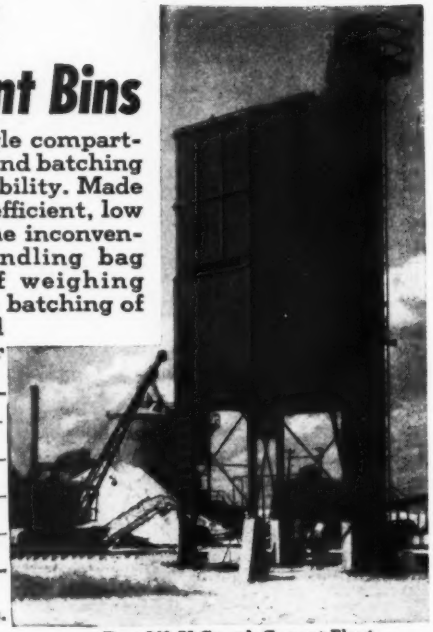

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Railroad maintenance engineers have found that the GRAVELY Model L 5-Horsepower Tractor with the Sickle Mower best solves their right-of-way mowing problems. The tractor's low center of gravity and the sickle's patented swivel action make it ideal for banks and slopes.

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(*Continued from page* 330)

mittees have completed their work for the year, no committee meetings were held in February. All bulletins containing committee reports are now in the hands of the members. In addition, the Year Book (Bulletin 473) will be in the hands of members before they leave for the convention.

National Railway Appliances Association

This association is holding its thirty-ninth annual exhibit at Chicago on March 15-18, coincident with the annual convention of the American Railway Engineering Association. On pages 288-289 of this issue is presented detailed information regarding this exhibit, including a statement by President C. L. Mellor (Barco Manufacturing Company) inviting readers of *Railway Engineering and Maintenance* to attend the exhibit. These pages also contain a complete list of the exhibitors to date, with their booth numbers, and a plan of the exhibit hall.

Supply Trade News

General

The **LeRoi Company,** Milwaukee, Wis., has announced that **Glen C. Hunt & Co.** has been appointed railroad sales agent for the company, with offices in the Atlanta Terminal Station Building, Atlanta 3, Ga.

The Chicago Pneumatic Tool Company has announced its intention to construct a new plant at Utica, N.Y., this spring. The plant, which will have more than 500,000 ft. of floor space, all on one story, has been designed, it is reported, in accordance with the latest techniques in materials handling, work simplification, and safety provisions.

The Butler Manufacturing Company, Kansas City, Mo., has announced the purchase of a factory building at Richmond, Cal. The main building is one story, 400 ft. wide by 413 ft. long, and is 70 ft. high. With annexed buildings, there are 179,000 sq. ft. of floor space. **Paul M. Shoemaker,** now assistant to the manager of the firm's Galesburg (Ill.) division, will be manager of the new Richmond division, and **Lloyd A. Anderson,** now sales manager at the Minneapolis (Minn.) plant for the company's line of steel buildings, will be transfererd to the new division in the same capacity.

Personal

George H. Carden, sales representative for the **Allis-Chalmers Manufacturing Company,** at Washington, D.C., has been named manager of the Baltimore (Md.) district office, and **T. G. Smith,** sales representative at New Orleans, La., has been appointed resident representative of this company at Beaumont, Tex.

(*Continued on page* 334)

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3" to 24" I.D.

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Makes Possible a Complete Pipe Rehabilitation Program for Water Service Lines at a Fraction of the Cost of Replacement!

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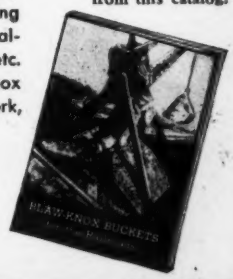

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(*Continued from page 332*)

Elmer Anderson, assistant service manager of the **Timken Roller Bearing Company,** has been promoted to service manager, succeeding **Pardee H. Frank,** who has retired after 27 years of continuous service.

Harold M. Schudt has been appointed general manager of the Gadsden (Ala.) works of the **Allis-Chalmers Manufacturing Company**. Mr. Schudt has served in the engineering department of the company's Tractor division since 1939.

A. J. Reading, service manager of the Railway division, **Chipman Chemical Company, Inc.,** with headquarters at Chicago, has been promoted to the newly-created position of manager of the Railway division, with the same headquarters.

John E. Heuser has been appointed assistant sales manager of the **LeRoi Company,** Milwaukee, Wis. Mr. Heuser is a graduate of the University of Wisconsin, and during the last three years has handled much of the sales administration for both LeRoi engine and compressor products.

John R. Gaut has been appointed assistant manager, Chicago district operations, of the **American Steel & Wire Co.,** and is succeeded as general superintendent at the Waukegan (Ill.) works by **Nelson W. Dempsey,** division superintendent of wire mills.

W. H. Holbert, manager of the Stuttgart (Ark.) works of **Fairbanks, Morse & Co.,** has been appointed manager of the plant at Three Rivers, Mich., succeeding **Kail E. Barrett,** who has resigned because of ill health, and **J. R. Walsh,** assistant manager of the Westco works at St. Louis, Mo., has been appointed works manager at Stuttgart.

W. A. Roberts, executive vice-president in charge of the Tractor division of **Allis-Chalmers Manufacturing Company,** and **W. C. Johnson,** executive vice-president in charge of the General Machinery division, have been elected to the company's board of directors, succeeding the late **Dr. Charles E. Albright** and **Harold S. Falk.** Mr. Falk, who is president of the Falk Corporation, has resigned because of weight of other business.

The Air Reduction Pacific Company, a subsidiary of the **Air Reduction Company,** which was recently organized to take over the West Coast business of the Air Reduction Sales Company, has announced the appointment of four vice-presidents, as follows: **L. A. Hamilton** for the Seattle, Wash., district; **E. W. MacCorkle, Jr.,** for the Portland, Ore., district; **H. W. Saunders** for the San Francisco, Calif., district and **H. A. Hoth,** for the Los Angeles, Calif., district.

Samuel O. Dunn, chairman of the Simmons-Boardman Publishing Corporation —publishers of *Railway Engineering and Maintenance*—has been elected, also, president of the corporation. **James G. Lyne,** vice-president and assistant to chairman, has been elected executive vice-president.

(*Continued on page 336*)

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Compare all 26 models of SKIL Drills with any drills you can name...compare drilling speed, power, handling ease... get the inside facts on gears, bearings, shafts, housings ... then you'll know why more buyers are buying more SKIL Drills every day. Your SKIL Tool Distributor is ready to show you that you can't buy a better drill than a SKIL Drill. Call him today.

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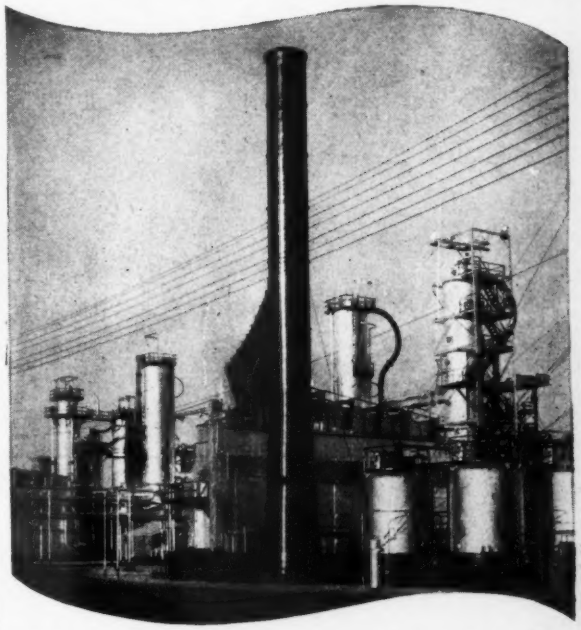

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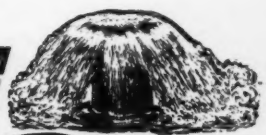
First of all, Layne well water systems and Layne vertical turbine pumps have always been noted for their superior engineering features. Next, they have always been manufactured from the finest materials available. And last, but very important, they are always installed according to Layne's exclusive standards. The results have been—more water, lower operation cost and longer life.

All of this adds up to the fact that for any situation demanding large quantities of well water at the ultimate in low cost, there is no equal to a Layne well water system. For literature address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.



LAYNE WELL WATER Systems

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Washington * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minnesota * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

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And many a floor has looked like it would take a beating, 'til it went into service—

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And with **Stonhard Resurfacer** you are sure of the results. Applied right over your old freight floors or platforms, **Stonhard** provides a smooth, safe surface . . . long lasting under heavy traffic. Try **Stonhard** on the basis of "Satisfaction or no charge."

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Please send us a free copy of the booklet, "Repair of Rough, Rutted Floors."

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(*Continued from page* 334)

Messrs. Dunn and Lyne will continue, as heretofore, to share jointly the editorship of Railway Age. **H. H. Melville,** district sales manager for the corporation's transportation periodicals at Cleveland, has been elected a vice-president, as has also **C. W. Merriken, Jr.,** district sales manager at New York.

L. E. Lee has been appointed sales manager of the **Duff-Norton Manufacturing Company,** with headquarters at Pittsburgh, Pa. Mr. Lee began his business career with the Goodyear Tire & Rubber Co. In 1933 he joined the Johns-Manville

L. E. Lee

Sales Corporation of New York, as manager of sales promotion and jobber relations, and for the past nine years he has worked in the transportation department of that company at Cleveland, Ohio.

Obituary

Harry W. Reade, apparatus sales manager for the Air Reduction Sales Company, died suddenly at Jersey City, N. J., on February 15 at the age of 56 years. Mr. Reade was born at Balston Spa, N. Y., on November 26, 1891, and started his business career 34 years ago with the Davis-Bournonville Company, manufacturers of oxyacetylene welding and cutting equipment. On the acquisition of this company by the Air Reduction Sales Company he became assistant manager of the Apparatus Sales division, continuing with Air Reduction in various responsible managerial positions in Chicago and New York until his death.

Trade Publications

(To obtain copies of ainy of the publications mentioned in this column, use postcards, page 231)

Bethlehem Switch Stands—The Bethlehem Steel Company has published a 32-page illustrated catalog, which describes this company's complete line of switch stands for heavy-duty, standard-gage service. It contains directions for ordering and installing the switch stands, and catalogs the repair parts available for each model. In addition it describes and illustrates all the accessories available for use with the Bethlehem switch stands and lists other Bethlehem products for railroads.

Fairmont Push Cars and Trailers—An eight-page bulletin describing the new line of Fairmont standard push cars and trailers has been published by Fairmont Railway Motors, Inc. It contains descriptive material with illustrations, and specifications of six different models of Fairmont standard trailers.

Fairmont Lightweight Trailers—A two-page descriptive bulletin on the new Fairmont lightweight trailers has been issued by Fairmont Railway Motors, Inc. The bulletin, which is illustrated, describes the essential features of the two new models, the T9 Series B and the T19 Series B, and contains a list of specifications.

Fairmont Spray Car—Fairmont Railway Motors, Inc., has issued a four-page bulletin describing the new Fairmont W66 Spray Car Series A. Illustrated and attractively printed, the bulletin describes the salient features of the spray car and contains a complete list of specifications.

Rail Pressure Welding—The Oxweld Railroad Service Company has compiled an illustrated folder containing numerous articles on the welding and installation of pressure-welded rail. The articles deal with the economics of welded rail, production and handling, and the use of continuous rail in tunnels, on bridges, and in open track.

Aggregate for Concrete Floors—Walter Maguire Company, Inc., has issued a 12-page, illustrated bulletin, No. 701, describing the advantages of natural emery as an aggregate for concrete floors. The booklet gives the recommendations of the leading cement companies and the Portland Cement Association for good aggregate, and shows comparative strength analyses.

Onan Standby Power—D. W. Onan & Sons, Inc., has published a folder entitled "Onan Standby Everywhere." This pamphlet, which is printed in two colors, describes how the installation of Onan emergency electric plants provides protection from power-line breakdowns, and also contains a table of capacities of these emergency plants and a description of the Onan automatic alternating-current line transfer controls. The folder is liberally illustrated with pictures showing various types of establishments served by these emergency plants.

Gas Welding Rods—A 3-color, 24-page, indexed brochure has recently been issued by the Page Steel & Wire division of the American Chain & Cable Co. The booklet covers the entire Page line of gas welding wire, and gives the application, procedure, proper torch adjustment, physical properties, etc., of each gas welding rod, and on the back page there is a convenient reference chart. Included in the book is information on oxy-acetylene flames, torch tips, pipe welding, weights of weld metal deposit, weights of gas welding rods, and estimated costs of manual oxy-acetylene welding.

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with clean water mains

When train servicing lags there's a good chance that an inadequate supply of water due to clogged pipes is the cause. Why tolerate delay when the National Water Main Cleaning Co. can quickly restore your mains to at least 95% of their original capacity?

Our engineers will gladly submit facts and figures on how National has solved this costly problem for other railroads.

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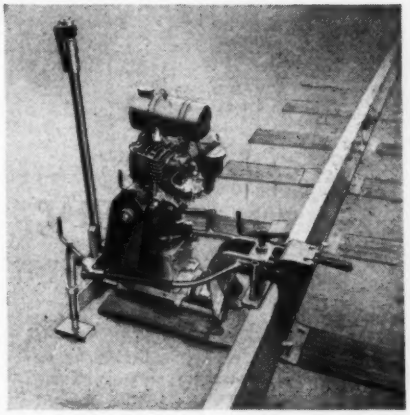
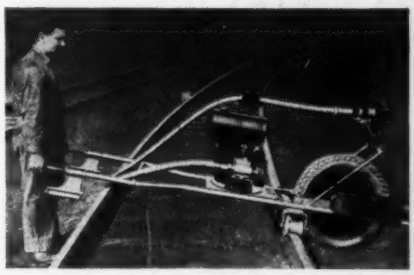
EASIER, FASTER TRACK WORK with these new RTW MODELS



Power Track Drill, Model P-34-A

Superb balance, light weight . . . features you'll appreciate in this new track drill. Attached and removed from rail *fast*. Quick, accurate adjustment for leveling with rail and uneven ground; adjusts to various rail sizes. Lateral feeding of drill by ratchet gear and rack simplifies operation. Holes up to 1½" in less than a minute. Motor raises or lowers on frame. V-belts well guarded.



Portable Flexible-shaft Grinder Model P-40

You'll like this new easier-to-handle grinder for both on- and off-track work. Transporting wheel adjusts to three positions by new, foolproof spring locking device —machine clears switches and crossovers with ease, levels quickly for off-track use, gets on and off track faster. Power-unit mounted on ball bearing turn table facilitates handling flexible shaft and attachments. Six hp. air-cooled gasoline engine or electric motor drive.

Get full details on these better, lighter, easier-to-work-with track machines. Bulletins on request.

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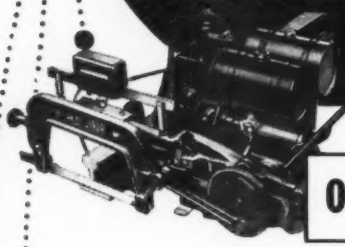
For High Speed

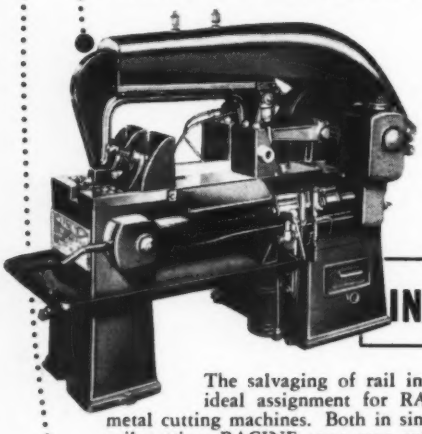
RAIL CROPPING

USE RACINE METAL CUTTING SAWS



ON TRACK

The RACINE Portable Rail Cutter is light, yet fast and accurate. Designed especially for road use, it can be lifted and moved by two men, thus speeding the job and preventing traffic delays which might be caused by heavier on-track equipment. The RACINE Rail Cutter is compact, individually powered, sturdy. In operation, it is a one-man tool, providing smooth rail cropping. The finished cuts are without thermal cracks that often lead to rail failure.



IN YARDS

The salvaging of rail in the yards is an ideal assignment for RACINE hydraulic metal cutting machines. Both in single and multiple rail cutting, RACINE saws crop split, worn or battered ends quickly and cleanly. RACINE machines, in capacities from 6" x 6" to 20" x 20", are hydraulically operated and controlled. They are simple in design and operation, rugged in construction, low on maintenance cost.

Ask for RACINE Catalog No. 12 and Bulletin 706A. Address RACINE TOOL AND MACHINE COMPANY, 1738 STATE ST,. RACINE, WISC.

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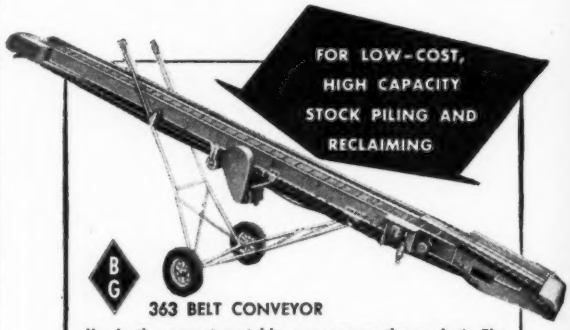
358 HOPPER-CAR UNLOADER

Here is the versatile car unloader — capable of unloading a hopper car in 45 minutes — ideal for steam coal, coke, or other abrasive materials. A heavy-duty, all-material unloader, the 358 features a non-slip, non-plugging belt, precision transmission, antifriction bearings . . . is equally efficient over the rails or in track pits. Capacity up to 3 tons per minute.



363 BELT CONVEYOR

Here's the newest portable conveyor on the market! The 363 is a high-capacity one-man unit that will pay for itself on large or small jobs by reducing costly truck waiting time, speeding unloading and reclaiming work. Its advanced B-G design includes the sturdier yet lighter stair channel construction and features a removable tail pulley cover. Plain or cleated belt.

See your B-G Distributor! Ask him for Bulletin 358 and take advantage of the services of his material handling specialists. Or write to . . .

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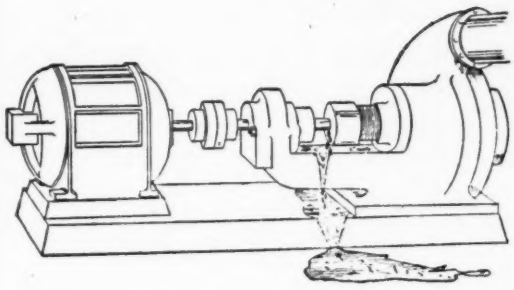
Constant Flow Equipment

TROUBLED WITH LEAKY BOXES STUFFING on Your Pumps?



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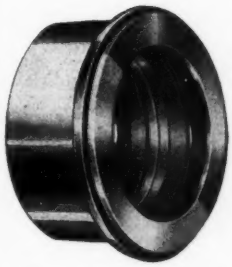
"Replacement"

SHAFT SEALS

Eliminate Leakage and Repacking Nuisance



Self-lubricating "Packaged" units—no conglomeration of parts to fuss with—easy to install. Just slide over shaft and secure.

Standard seals for handling clean water, refrigerant gases, oils and other petroleum products—in temperatures from —10° F. to +250° F.—and pressures up to 250 p.s.i.

Special seals for corrosive and abrasive liquids.

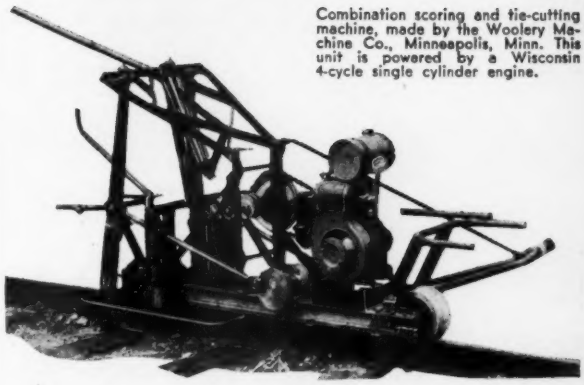
Built-in flexibility eliminates wear from shaft misalignment, shudder or vibration.

Available for shafts from 1/4" up to 24" dia.

Illustrated folder available on request

SYNTRON CO.

290 Lexington — Homer City, Pa.



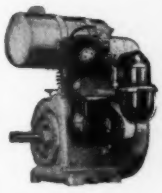
Combination scoring and tie-cutting machine, made by the Woolery Machine Co., Minneapolis, Minn. This unit is powered by a Wisconsin 4-cycle single cylinder engine.

for most H. P. Hours of ON-THE-JOB Service Specify WISCONSIN *Air-Cooled* ENGINES

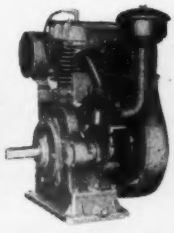
Whether the job calls for scoring or cutting ties with the Woolery combination rig illustrated above . . . or any one of a great number of power jobs that are always waiting to be done in railway maintenance service . . . you will always be sure of the most machine-hours of productive work if your equipment is *Wisconsin-powered.*

Wisconsin Heavy-Duty Design and construction includes such features as Timken tapered roller bearings at BOTH ends of the dynamically balanced crankshaft; weather-sealed outside magneto with impulse coupling for quick, easy starts in any weather; exceptionally efficient and dependable AIR-COOLING for all-weather serviceability . . . all of which contributes to the most effective utilization of manpower and machine-power.

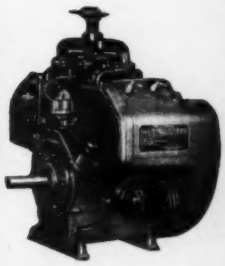
Specify "Wisconsin Engines" for the most Hp. Hours of on-the-job service.



Models AB and AK 4-cycle single cyl. engines available in 2 to 4 hp. sizes.



Models AEH, AFG, AGH, AHH 4-cycle single cyl. engines, 4 to 9 hp.



Models VE-4 and VP-4 V-type, 4 cyl. engines up to 30 hp.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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CUT FIRE LOSS ON WOODEN BRIDGES
AND TRESTLES WITH THE

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A Single, Easy Application Gives Years of Protection . . . .

During the year 1946 alone, according to authoritative sources, fire damage to wooden railroad bridges and trestles amounted to $1,446,429.00. Nearly a million and a half dollars—plus the loss and inconvenience occasioned by disrupted schedules and train re-routing. Leading American railroads (names upon request) are now restricting these devastating fires with the tested and proved LIBBEY-ZONE PROCESS using HEAVY-DUTY Coating—the outstanding scientific discovery that combines genuine *Canadian asbestos fibre with electrolytically purified asphalt.* With proper crushed stone or gravel aggregate added, a LONG LASTING, SINGLE APPLICATION FIRE RETARDANT SURFACE is provided for open deck bridges and trestles. "ZONE" HEAVY-DUTY Coating is easily and speedily applied. Write today—and let us tell you about the money saving advantages of . . .

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Light Weight
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Arnold gives you all of these features:

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POSITIVE LUBRICATION — good to the last drop. Patented feeder insures automatic lubrication.

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Order from your dealer
If he cannot supply you, write direct, sending us your dealer's name.

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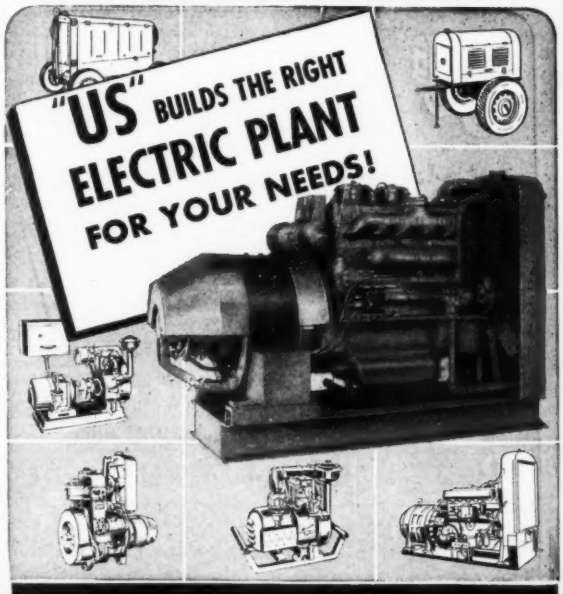

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Q and C Manganese Switch Point Guards will guard against wear on Switch Points from either facing point or trailing movements and will prevent derailments caused by sharp wheel flanges climbing on worn points.

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UNIT 357 Mobile Crane is self-propelled ... Rides on rubber ... Ready for action with a push on the starter ... Travels anywhere ... gets there in a hurry. Fully convertible to all attachments ... Operated by ONE man ... Powered by ONE engine ... Controlled from ONE position in UNIT's safety promoting FULL VISION CAB.

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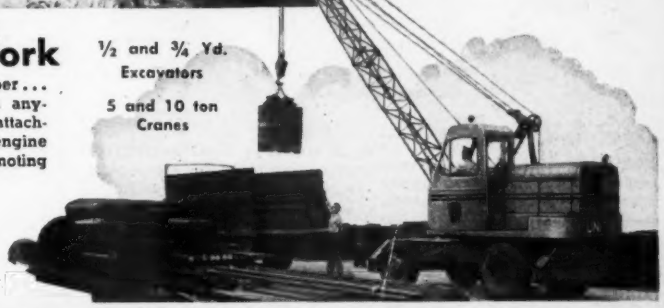

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Serving 72% OF AMERICA'S CLASS I RAILWAYS

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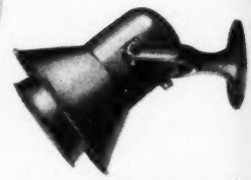

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By WALTER F. RENCH
Formerly Supervisor on the Pennsylvania Railroad

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Curves: The Relining of Curves with a String—Preliminary Study of the Curve—The Solution of String Lining Problems—Superelevation of Curves—The Spiral—The Vertical Curve—Economics of Curves—Practical Switch Connections: Essential Elements in the Design of Switch Connections—Rules for Computing Switch Dimensions—Rules for Various Functions of Turnouts—Practical Considerations in Installing Turnouts—Methods in Installing and Maintaining Switches—Siding Location: Simplified Field Work—Special Practices.

1947. 5th. 212 pages, 24 illus., index, 5 x 7, flexible. $3.00

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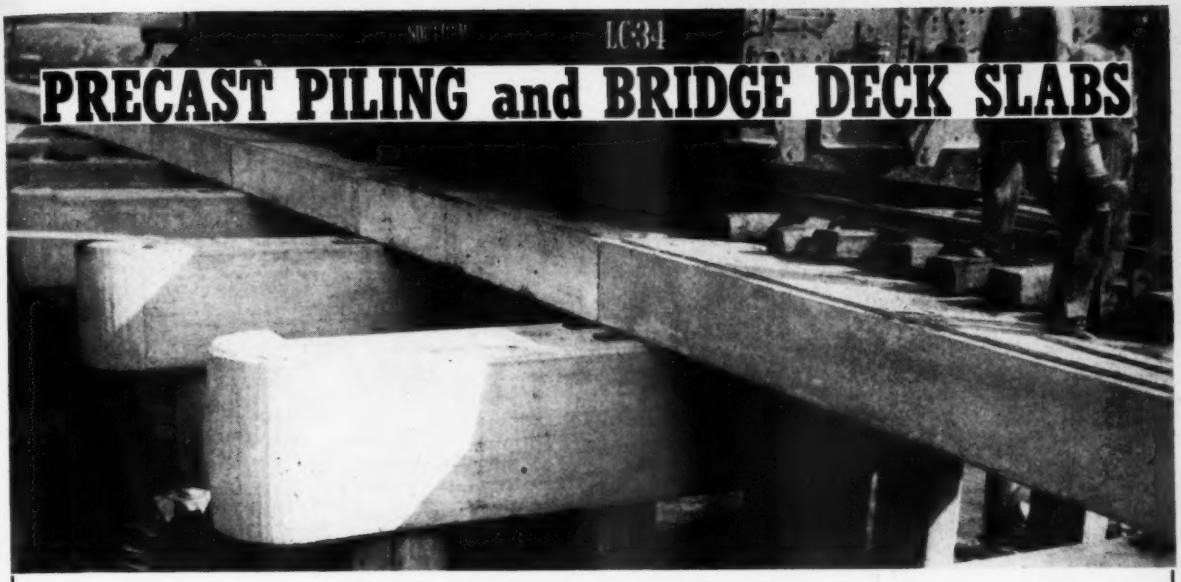

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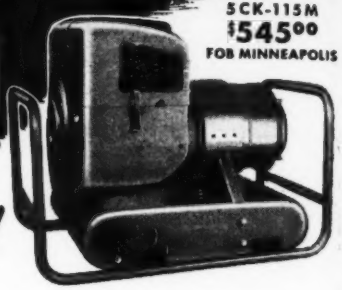

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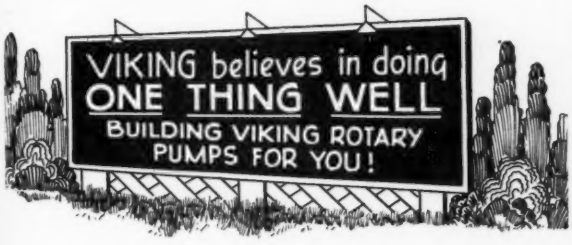

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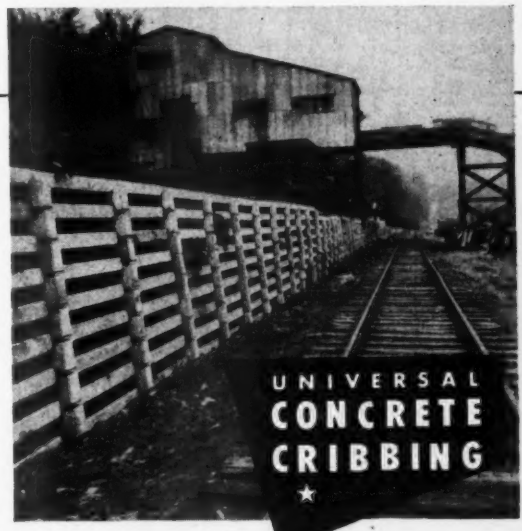

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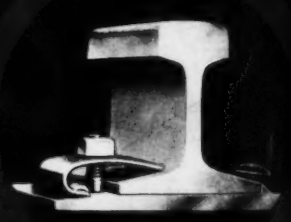

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